LAKE N6176V S/N 829

OWNERS MANUAL

TURBO-LAKE
LAKE LA-4
LAKE SEAPLANE

To The Owner

CONGRATULATIONS! You have just bought the finest Amphibious Aircraft ever produced. No other aircraft has ever brought its owner such utility and versatility.

The delightful freedom of water flying opens up an entirely new world. Adding amphibious capability, allows a return to the airport for necessary fuel, service, lodging, or airline connections and completes the circuit of versatility.

Let us set forth the basic philosophy that has been the guiding principle of our program of continuing improvements and new models. From the very beginning of flight, amphibious flying capability has captured the imagination of man; but it was Glen H. Curtiss who brought this dream to reality as his Curtiss Flying Boat lifted from the surface of Lake Keuka at Hammondsport, New York, in 1911. Throughout the ensuing years many reasonably successful flying boats were built. Can there be a pilot today who does not remember the romance of the Boeing China Clippers flying the first international routes charted by Charles A. Lindbergh for Pan American Airways?

Your new LAKE Amphibian embodies all the technology and experience gained over these many years, plus the latest in hull design, metallurgy, material, and engine power-to-weight ratios. With these new technological advances as tools with which to work, the designers of the LAKE Amphibian set out to produce a modern and capable amphibious aircraft. As a result, your new LAKE Amphibian aircraft has the finest water handling characteristics ever, forgiving and docile flying qualities, and has speed and load carrying ability never before available in amphibious aircraft.

LAKE Aircraft's philosophy is that in building an amphibian from the very start, you will create a better product for less initial cost and lower operating costs than when attempting to adapt land aircraft to water operation. Amphibious floats, built to adapt a land aircraft to water, are extremely rugged and well designed in their construction, and are capable of withstanding most of the rough use to which they are subjected while operating in water. The aircraft to which they are attached, however, were not designed to take this kind of abuse, and in spite of the many modifications and basic structural changes necessary, become at best, a nightmare of extreme compromises.

Knowing that your LAKE Amphibian will be subjected to the rough service of water operations, the entire airframe is designed to be strong where it needs to be strong, light where it needs to be light, and large enough to carry its full useful load. Knowing, also, that it will be operated in the element of salt water sometime during its life, LAKE has corrosion-proofed the aircraft inside and out and eliminated all cables, pulleys and rigging wires necessary to float-equipped amphibious aircraft. This reduces maintenance and operating costs to a minimum as compared to costs often reaching calamitous proportions associated with land aircraft adapted to the water.

Without the huge bulk of amphibious floats, and the weight (in some cases over 800 lbs.), your LAKE Amphibian will out-perform any amphibious aircraft, and with less expense in both initial and operation costs.

In this manual, we have attempted to describe the operation of your new LAKE Amphibian in as clear a manner as possible, so that you may realize the utmost in pleasure, safety, and utility from your new aircraft.

We here at LAKE are always at your disposal to answer any further questions you might have with respect to the operation of your aircraft, service, or any unique or unusual operations about which you may have questions. The total experience of our staff affords you access to a wealth of knowledge of amphibious flying, and particularly LAKE Aircraft operation, that is not available anywhere else in the world. Please feel free to contact us at any time.

We know that you will enjoy your new aircraft and the new world of freedom that amphibious flying offers. Your introduction of others to our aircraft and its versatility is greatly appreciated. Let's all help to continue to expand the fraternity of amphibious and seaplane fliers. Thank you, again, for your decision to join this fortunate group that gets to see and visit so much of this beautiful world so easily.

Knowing Your Airplane

The better you know your airplane, the more skilled you will be when handling it . . . the safer you will be when flying it . . . the more competent you will be when checking and maintaining it. This manual is designed to provide you with that basic knowledge. It covers all operating procedures associated with taxiing, take-off, cruising and landing, either on ground or on water. It describes the structure and components, and covers procedures that you should follow during maintenance and inspection.

You will find the LAKE Amphibian suitable for almost any use . . . personal, business, charter service, or off-shore operations. Designed with a straight-through frame and an all metal exterior, it possesses ruggedness and strength in excess of that required to withstand the stresses imposed under severe flying or landing conditions. The large differential between take-off and cruising speeds insures short take-off, rapid climb-out and greater flying safety.

The LAKE Amphibian will operate equally well from land or water, requiring a water depth of as little as 1 foot for landing or take-off.

Beautifully appointed, the cabin is designed not only for safety, but for comfort. With the engine mounted overhead, the cockpit noise is much less than would be expected in any aircraft, and the large wrap-around windshield provides excellent visibility, making flying more enjoyable as well as safer.

If you have previously handled amphibious aircraft, you will be pleasantly surprised by the water performance of the LAKE.

Its hull features a "step" that permits faster take-off and softer landings, while the general configuration is such that the LAKE displays excellent handling characteristics even when taxiing in crosswind or downwind conditions. We believe the LAKE Amphibian to be the finest amphibian ever designed and built, and are certain that you will thoroughly enjoy your new amphibian. Pleasant flying!

Lake AIRCRAFT

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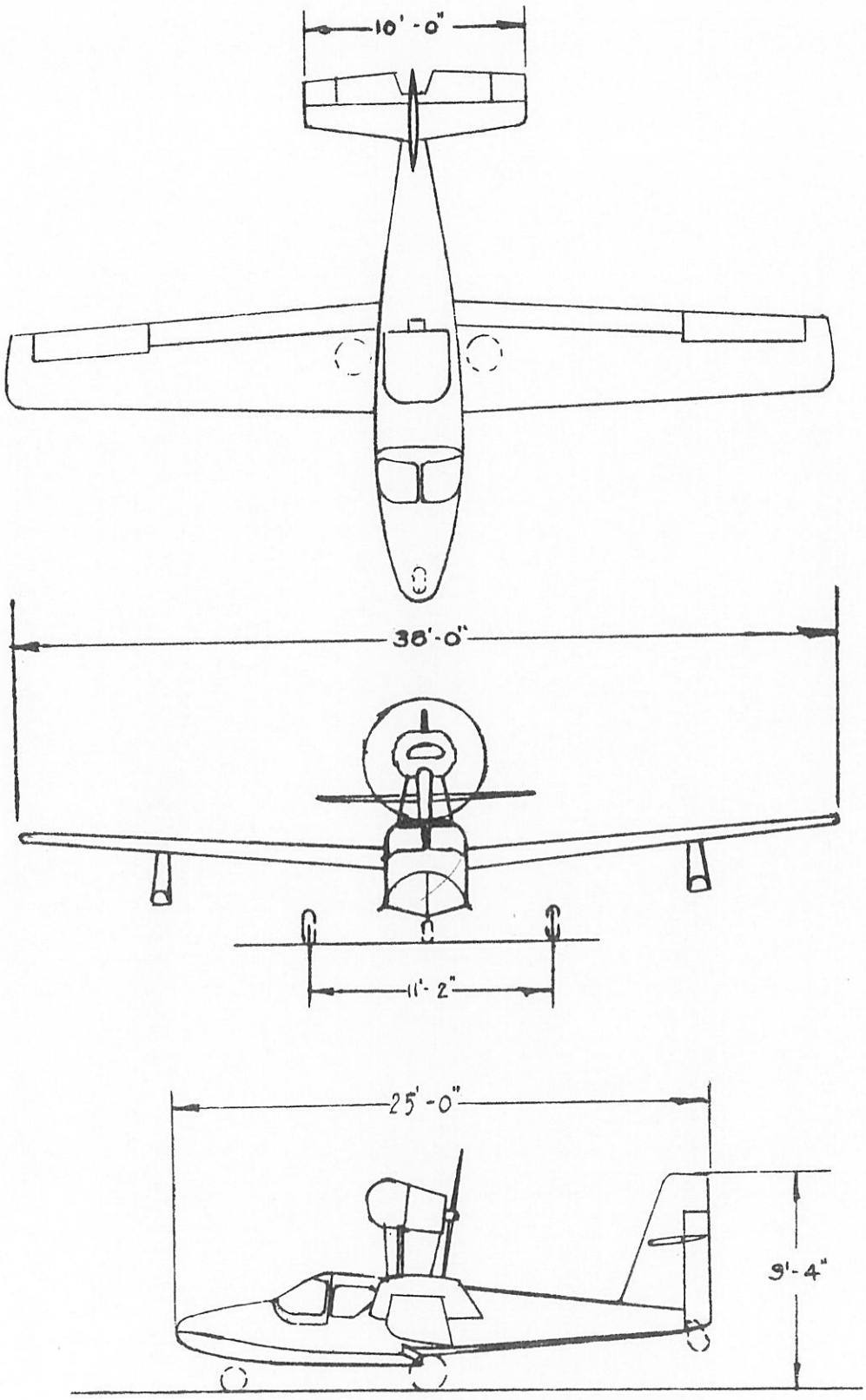


PRINCIPAL DIMENSIONS

SECTION I
Design Features and Performance
LAKE LA-4 AMPHIBIAN

Engine	Lycoming Model O-360-A1A direct drive, air-cooled, 4 cylinder, 180 hp, at 2700 rpm.
Propeller	Hartzell 72-in. diameter, constant-speed, variable pitch.
Weights	Useful - 845 lbs. Empty - 1555 lbs. Gross - 2400 lbs. (See weight and balance statement furnished with each aircraft for exact weights).
Fuel	Maximum 40 gals. (240 lbs.) 100/130 octane.
Oil	Over 40 degrees F - SAE #50 Under 40 degrees F - SAE #30
Baggage capacity	200 lbs. in baggage compartment.
Performance	Stalling speed, cruise configuration - 52 mph (TIAS) Landing configuration - 45 mph (TIAS) Maximum cruising speed 146 mph (TIAS) Sea level climb 800 fpm (TIAS) Range (full fuel, gross wt., normal cruise 75% power) 500 miles Service ceiling 13,000 ft. Differential between take-off and maximum cruising speed 101 mph
Dimensions	Span 38 ft. Length 24 ft., 11 in. Over-all height 9 ft., 4 in.
Tire pressure	Nose wheel 15 lbs. Main gear wheel 30 lbs.

LAKE SEAPLANE

Engine	Lycoming Model O-360-A1A direct drive, air-cooled, 4 cylinder, 180 hp, at 2700 rpm.
Propeller	Hartzell 72-in. diameter, constant speed, variable pitch.
Weights	Useful -1056 lbs. (See weight and balance statement furnished with each aircraft for exact weights). Empty -1344 lbs. Gross -2400 lbs.
Fuel	Maximum 40 gals. (240 lbs.) 100/130 octane.
Oil	Over 40 degrees F - SAE #50 Under 40 degrees F - SAE #30
Baggage capacity	200 lbs. in baggage compartment.
Performance	Stalling speed, cruise configuration -52 mph (TIAS Landing configuration -45 mph (TIAS) Maximum cruising speed 146 mph (TIAS) Sea level climb 900 fpm (TIAS) Range (full fuel, gross wt., normal cruise 75% power) 500 miles Service ceiling 13,000 ft. Differential between take-off and maximum cruising speed 101 mph
Dimensions	Span 38 ft. Length 24 ft., 11 in. Over-all height 9 ft., 4 in.

TURBO-LAKE AMPHIBIAN

Engine	Lycoming Model O-360-A1A direct drive, air-cooled, 4 cylinder, 180 hp, at 2700 rpm. Fitted with Rajay turbo-charging system.	
Propeller	Hartzell 72-in diameter, constant-speed, variable pitch.	
Weights	Useful - 810 lbs. Empty - 1590 lbs. Gross - 2400 lbs.	(See weight and balance statement furnished with each aircraft for exact weights).
Fuel	Maximum 40 gals. (240 lbs.) 100/130 octane.	
Oil	Over 40 degrees F - SAE #50 Under 40 degrees F - SAE #30	
Baggage capacity	200 lbs. in baggage compartment.	
Performance	Stalling speed, cruise configuration	- 52 mph (TIAS)
	Landing configuration	- 45 mph (TIAS)
	Maximum cruising speed	146 mph (TIAS)
	Sea level climb	800 fpm (TIAS)
	Range	(Depends upon TAS at desired altitude. Maximum 640 mi.)
	Service ceiling	(Aircraft is certified for maximum continuous power [28 in. hg. at 2600 rpm] to 20,000 ft.)
Dimensions	Span	38 ft.
	Length	24 ft., 11 in.
	Over-all height	9 ft., 4 in.
Tire pressure	Nose wheel	15 lbs.
	Main gear wheel	30 lbs.

LAKE BUCCANEER 200HP AMPHIBIAN

Engine

Lycoming Model IO-360-A1B, direct drive, air cooled, 4 cylinder, 200 hp, fuel injected at 2700 rpm.

Propeller

Hartzell compact model 74 in. diameter, constant-speed, variable pitch.

Weights

Useful - 1055
Empty - 1545
Gross - 2600

(See weight and balance statement furnished with each aircraft for exact weights.)

Fuel

Main tank 40 gals. (240 lbs.) 100/130 octane. Approx. 15 gals. (90 lbs.) additional fuel may be carried in optional wing float auxiliary tanks.

Oil

Over 40 degrees F - SAE #50
Under 40 degrees F - SAE #30

Baggage capacity

200 lbs. in baggage compartment.

Performance

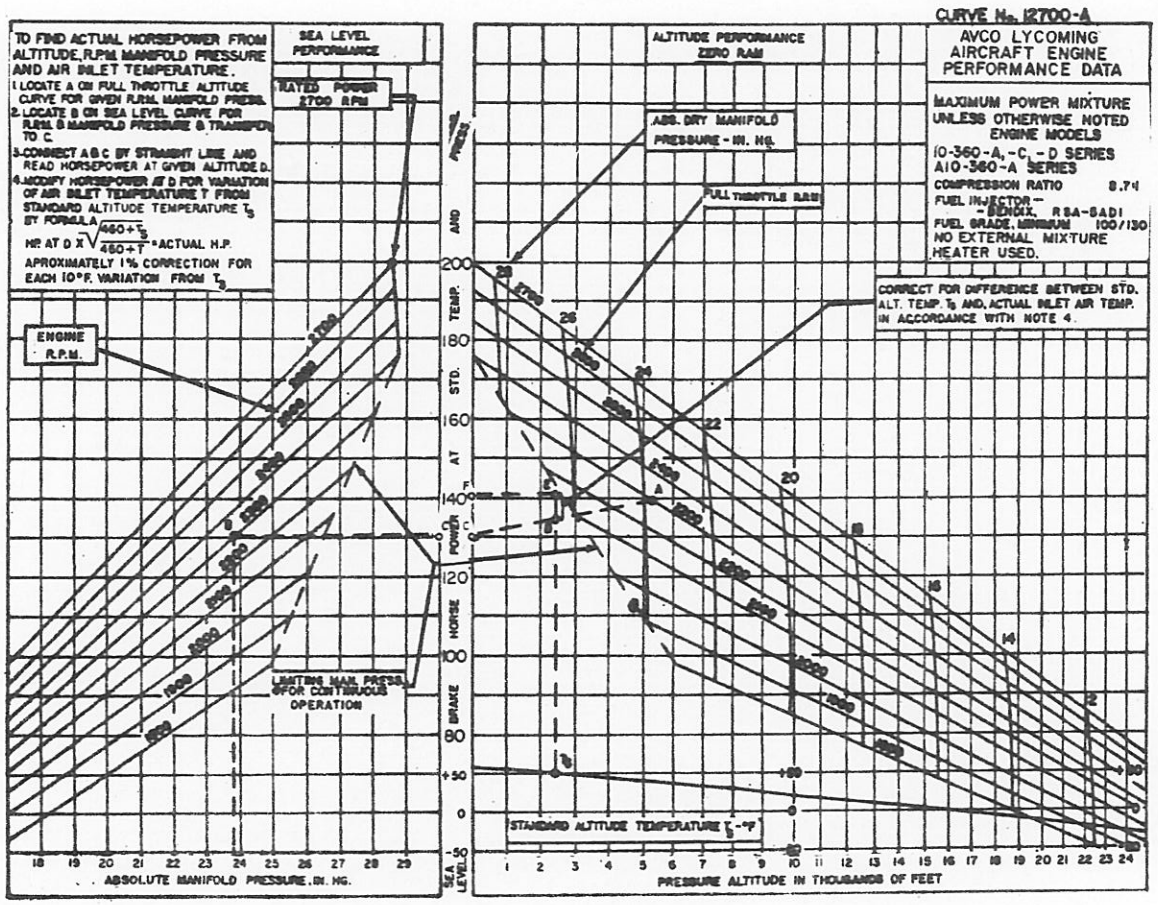
Stalling speed, cruise configuration	-52 mph (TIAS)
Landing configuration	-45 mph (TIAS)
Maximum cruising speed	146 mph (TIAS)
Sea level climb	1200 fpm (TIAS)
Range - Normal cruise, 75% power	650 mi.
Max. range (with aux. tanks)	840 mi.
Service ceiling	14,000 ft.
Differential between take-off and maximum cruising speed	101 mi.

Dimensions

Span	38 ft.
Length	24 ft., 11 in.
Over-all height	9 ft., 4 in.

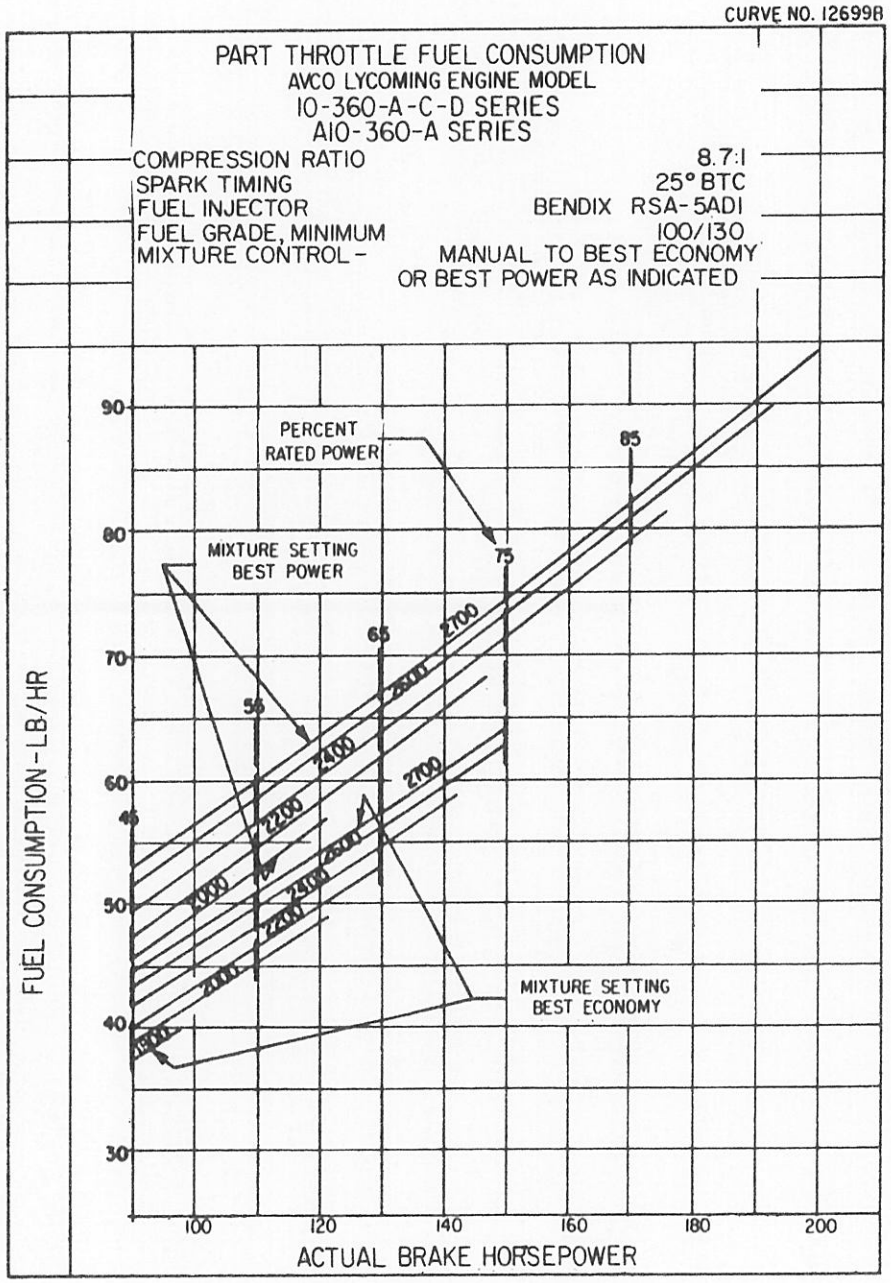
Tire pressure

Nose wheel	15 lbs.
Main gear wheel	30 lbs.



IO-360 200 HP BUCCANEER

Sea Level and Altitude Performance



IO-360 200 HP BUCCANEER
Part Throttle Fuel Consumption

Operating Procedures

PREFLIGHT INSPECTION

NOTE

If flight at night is planned, check operation of all lights and make sure a flashlight is on board.

PART I

A. Turn on master switch and check ignition both off.

B. Check oil, above 6 quarts, and below 8 quarts (fill for extended flight).

C. Check fuel level by eye for full; use dip stick if below full.

D. Drain fuel line and tank sumps at quick drains.

E. Check hydraulic reservoir for proper quantity.

F. Drain all 6 watertight compartments (7 plugs on aircraft).

G. Check fuel quantity indicator.

PART II

1. Raise water rudder .
2. Check left wing for anything unusual.*
3. Check left landing gear for security, brake condition, leaking fluid, extension of strut, condition of tires and hydraulic lines.
4. Check pitot tube for security and clogged ports.
5. Activate stall warning tab.
6. Check hinge pins on ailerons and bolts and nuts on flaps, left wing.
7. Check vertical and horizontal stabilizer for anything unusual. *
8. Check elevator, trim tabs and air rudder for hinge pins & security of attachment.
9. Check water rudder for proper extension.
10. Check prop for nicks, cracks, excessive oil or grease and general condition.
11. Check right flap bolts and nuts, aileron hinge pins for security and attachment.
12. Check right wing for anything unusual.*
13. Check right landing gear for security, brake condition, leaking fluid, extension of strut, condition of tires and hydraulic lines.
14. Check nose wheel shimmy dampener, inflation of strut, and tire condition

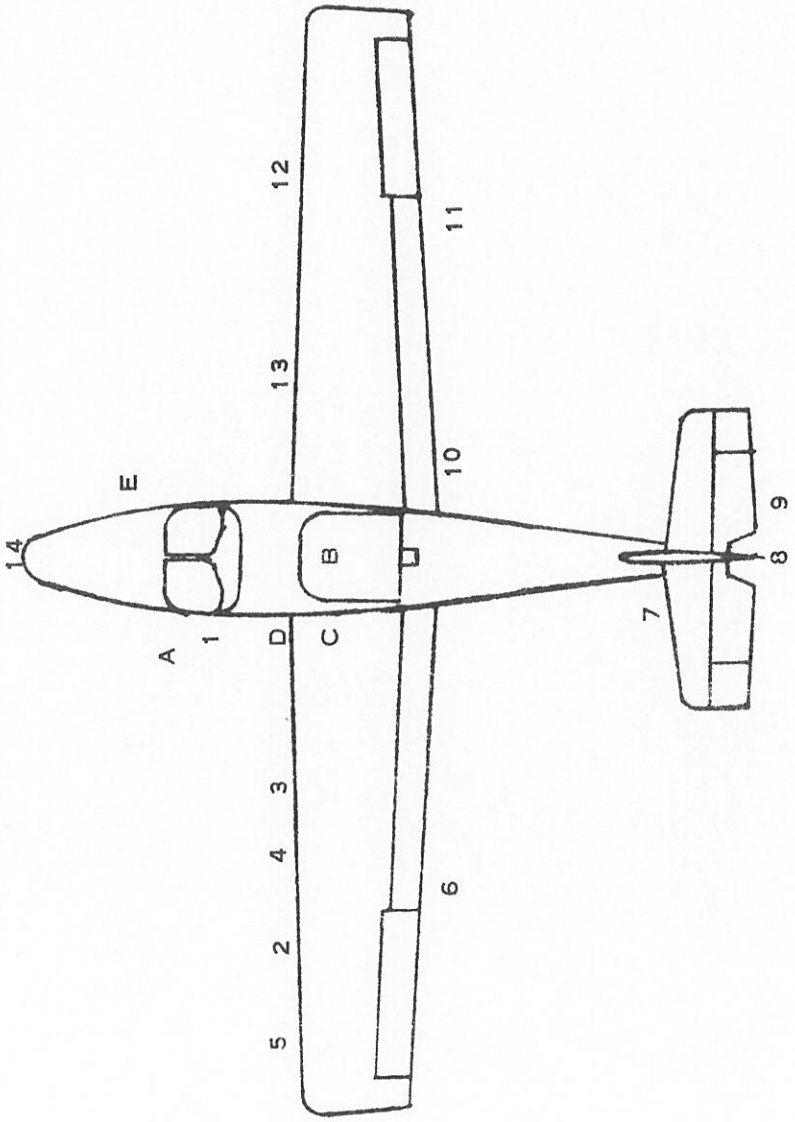
PART III

1. Remove GUST LOCKS AND TIEDOWN LINES

2. Enter cockpit and prepare to start engine.

NOTE:

*Anything unusual can be summarized as dents to leading edges or surfaces, cracks, tears, missing rivets, wrinkled skin indicating structural damage, items loose or missing from aircraft.

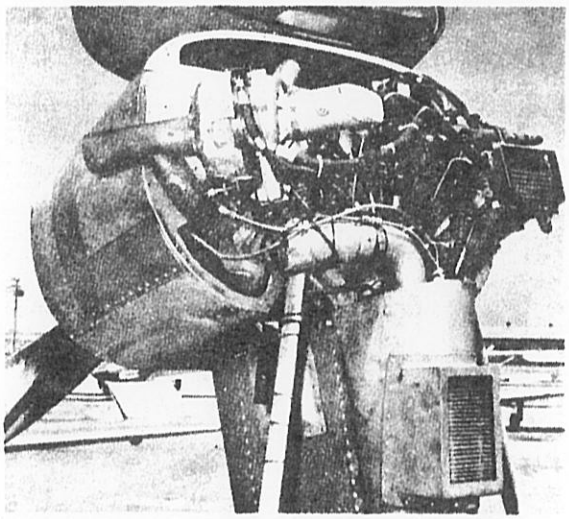


STARTING PROCEDURES

FOR THE 180HP LAKE LA-4, SEAPLANE AND TURBO LAKE

After entering the cockpit of the plane, turn on the switches located on the lower left-hand side of panel for the battery, alternator, electric fuel pump and hydraulic pump. Be sure that the carburetor heat control is set for "cold." The main fuel valve located on the bulkhead in the rear of the cabin must be set to the "on" position. Move the mixture control, located overhead, forward to "full rich" and set the propeller pitch control, located near mixture control, forward to "full rpm." Turn the magneto switch to "both." Then crack the throttle slightly and actuate the starter button, holding the plane with the brakes. If the engine does not start, repeat the procedure. During cold weather, it may be necessary to rapidly move the throttle forward and backward while the engine is turning over.

A slight clicking noise may be heard during starting. This is the electric fuel pump forcing gas to the overhead engine, and is not abnormal to the starting cycle.



The engine cowling design allows the turbo-charger to be completely enclosed on the TURBO-LAKE.

200HP FUEL INJECTED BUCCANEER

After entering the cockpit, turn on the switches located on the left-hand side of the panel for the battery, generator and hydraulic pump. Main fuel valve located on the bulkhead in the rear of the cabin must be set to the "on" position. Brakes on, propeller control forward for high rpm, magnetos on both.

COLD START

(1) Open throttle approximately ½ inch.

(2) Move mixture to full rich position.

(3) Turn on electric fuel pump for approximately 10 seconds, then turn off.

(4) Move mixture control to idle cut off (rear to full lean position).

(5) Engage starter.

(6) When engine fires, move mixture control to the full rich position. If the engine does not fire within five to ten seconds, disengage starter and re-prime.

HOT START

(1) Open throttle approximately ½ inch.

(2) Leave mixture control at idle cut-off.

(3) Turn electric fuel pump on for a few seconds.

(4) Engage starter.

(5) When engine fires, move mixture control to the full rich position.

(6) Should the engine not start, flood it deliberately and use the following procedure.

FLOODED START

(1) Open throttle full.

(2) Leave mixture control at idle cut-off.

(3) Electric fuel pump off.

(4) Engage starter until engine fires.

(5) Move mixture control forward slowly to full rich position and retard throttle.

WARM-UP

After the engine has started, immediately observe the oil pressure gauge on the right-hand side of the instrument panel. If no pressure is indicated within thirty seconds, move the throttle back, stop the engine, and locate the cause of failure. If the oil pressure reading is normal, advance the throttle until the tach reading is between 800 and 1200 rpm, warm-up the engine for approximately two minutes in warm weather and four minutes in cold weather. Engine warm-up is sufficient when the throttle can be opened without the engine faltering.

Following the warm-up period, advance engine speed to 1800 rpm and check the magnetos. The magneto drop should not exceed 100 rpm. Then, with a manifold pressure of 20 in., move the propeller pitch control to "high pitch." Engine speed should be reduced approximately 500 rpm. It is mandatory that the engine be warm for this check as this propeller pitch mechanism is operated by the engine oil. Do not use excessive manifold pressure with low rpm or damage to the engine may result.

GROUND TAXI

Release the brakes by pushing parking brake knob. Advance the throttle gradually. Taxi direction is controlled by braking either the left or right main landing gear. The wide track of the main gear and the wide angle through which the castering nose wheel turns, allows a very short turning radius. A new LAKE pilot can become very adept at ground handling in just a few minutes of practice.

TAKE-OFF AND CLIMB . . .

GROUND OPERATIONS

Set the trim tab adjustment located on the floor between the pilot and co-pilot to rear of the green arc. It is wise to check tabs visually for about 30° up trim . . . move the carburetor heat to "cold," if applicable. Check the mixture control for "rich," set the propeller for full rpm, lower the flaps, and check to see that the auxiliary fuel pump is still

in the "on" position. Then advance the throttle to "full." A slight propeller surge is normal with full throttle on the take-off.

Take-off distance at sea level under normal conditions at gross weight is 650 feet. As soon as the plane is airborne, retract the landing gear by means of the hydraulic selector control mounted in the lower left center of the instrument panel. This control retracts both the nose gear and main gear. Check for up gear light.

The recommended initial rate of climb speed at gross weight is 65 mph with full throttle and 2700 rpm, flaps down, or 85 mph with flaps up. The best angle of climb speed is 60 mph. All take-offs and landings should be made flaps down.

ON TAKE-OFF gear should be retracted as soon as plane is airborne. Short take-off distance and fast climb-outs are distinct advantages to the LAKE.

LAKE CHECK LIST

TAKE OFF

BATTERY . . . . . ON
GENERATOR . . . . . ON
FUEL PUMP . . . . . ON
HYD. PUMP . . . . . ON
FUEL VALVE . . . . . ON
MIXTURE . . . . . RICH
PROP . . . . . HI-RPM
CARB HEAT . . . . . COLD
TRIM . . . . . SET
FLAPS . . . . . DOWN
ENGINE INST. . . . . CHECK
CONTROLS . . . . . FREE

LANDING

FUEL PUMP . . . . . ON
HYD. PUMP . . . . . ON
MIXTURE . . . . . RICH
PROP . . . . . HI-RPM
CARB. HEAT . . . . . AS REQ.
FLAPS . . . . . DOWN
GEAR-DOWN . . . . . (LAND)
GEAR-UP . . . . . (WATER)

CRUISING

After reaching the desired altitude level off, turn off the auxiliary fuel pump, reduce power to cruise power and lean out the mixture if above 5,000 feet.

Although the proper setting of the mixture control for cruising cannot be predicted, pilots, after flying a number of hours, will be able to adjust to it automatically. When cruising at altitudes above 5000 feet, always lean out the air-fuel mixture. The optimum cruising speed of the LAKE is dependent on many variables such as power settings, altitude, air temperature, and external antenna provisions.

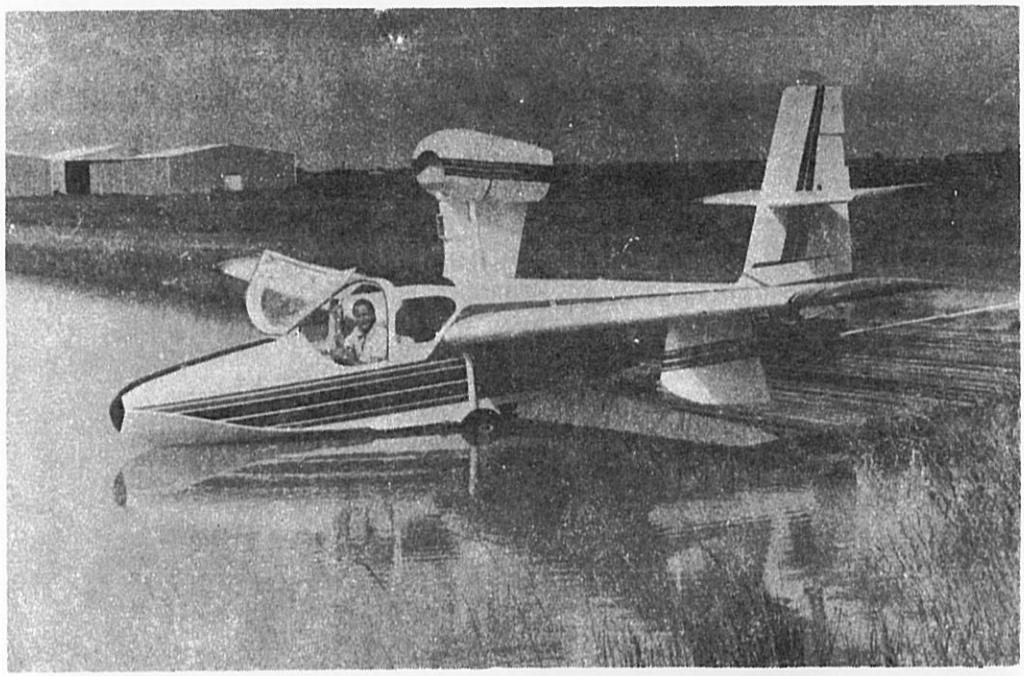
Normal cruising power is 75 percent of the rated horsepower. Indicated air speed decreases 1 mph per thousand feet of altitude at 75 percent of rated horsepower, while true air speed increases 1.3 mph per thousand feet under the same conditions. The maximum continuous engine speed for all operations is 2700 rpm. Refer to the Lycoming engine manual for various power settings.

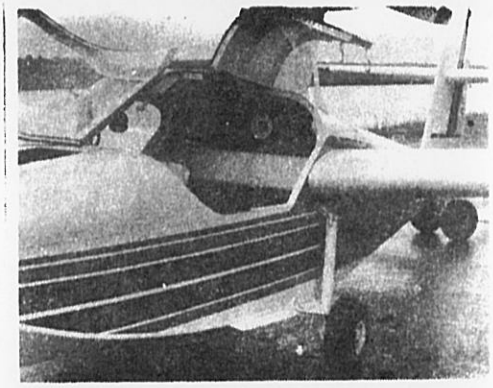
It should be noted that the LAKE has several advantageous flight characteristics: (1) unlike other small planes, a 180° turn may be made using rudder control alone without entering a spiral dive or losing excessive altitude: (2) the propeller, being mounted above the hull, allows the more efficient pusher configuration. The pusher engine is mounted with a slight up-thrust angle to compensate for the high thrust-line. This reduces any tendency to force the nose up or down with power changes to a minimum. (3) The shoulder wing configuration, with the pilot and passengers in front of the wing, allows full visibility up and down. Excellent aerial photographs can be taken from your LAKE, as the wing does not interfere with the peripheral vision of the camera.

APPROACH AND LANDING . . .
GROUND OPERATIONS

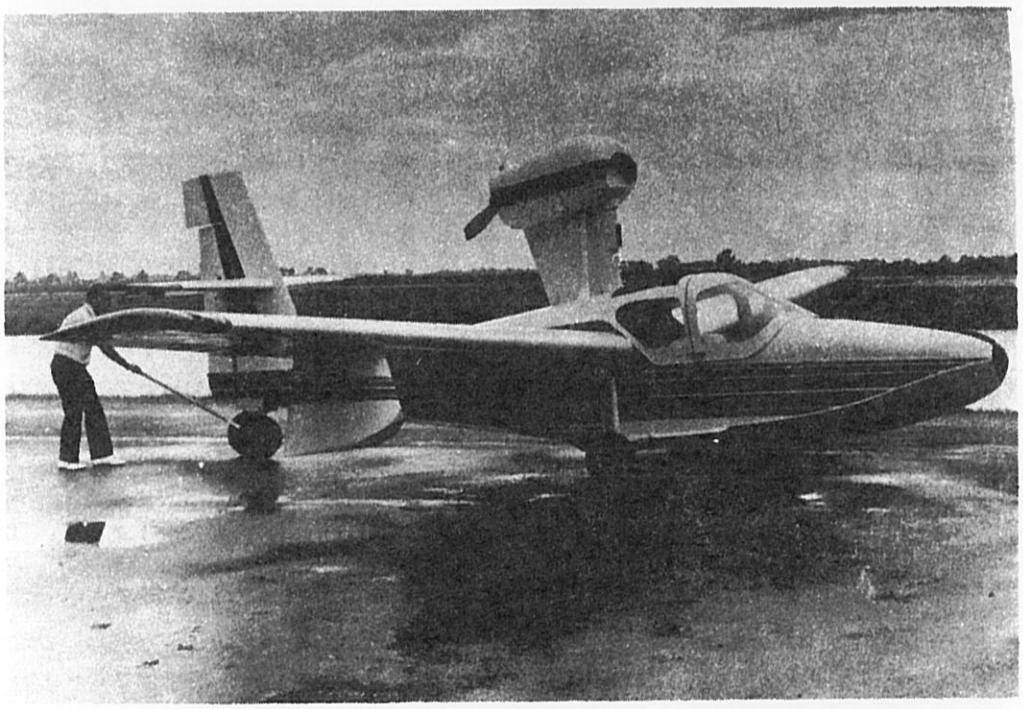
On the approach, use the checklist with the ADDED CAUTION OF DETERMINING VISUALLY THAT THE LANDING GEAR IS PROPERLY POSITIONED FOR GROUND LANDING.

Make the approach between 75 and 80 mph with flaps extended and auxiliary fuel pump on. Use power as necessary to make a smooth approach and letdown. Reduce speed during the flare-out and touch on the main gear.





THE LAKE SEAPLANE ON removable beaching gear and taxi dolly makes taxiing, launching and beaching simple operations. Inset shows: optional cargo hatch installed on LAKE SEAPLANE.



PARKING

To apply parking brake, depress the pedals and pull back the parking brake knob located on the instrument panel. Then release the pressure on the pedals. The parking brake may unlocked from the inside or outside the plane, if desired, by reaching into the cabin and pushing the knob forward. Chocks are preferable to leaving the brakes on overnight.

APPROACH AND LANDING ON WATER

Unlike landing on hard surface, where the runway is well defined ,and a windsock, or tee, defines the wind direction and velocity, the water landing direction and technique must be decided by the pilot in each situation. The pilot must scan the complete area in which he intends to land, for wind direction, roughness of water, criss-crossing boat wakes, moving boats, floating debris and underwater obstacles. Most important is knowing where the surface of the water is. Wind direction can be determined by several methods: Streaks and chop, sailboats, smoke, flags and landing ducks or geese. Always land as much into the wind as possible. Remember that while on the water, the aircraft is always moving to some degree, either power on or power off, due to currents and wind. It will also tend to weathercock with any appreciable amount of wind. For obvious safety reasons never land or take-off directly toward boats, and if possible never land or take-off straight in toward the shore unless there is adequate room to abort if necessary. Bear in mind, in reading the following paragraphs, that there are basically 2 types of landings - the step landing and the full stall landing. In between usually results in a bounce or skip with a full stall-wing level recovery.

On each leg of the approach prior to landing on water, it is recommended that in addition to following the checklist, the pilot audibly repeat, "This is a water landing, the landing gear is up," in addition to checking visually on the base leg. Put the flaps in the "down" position and compensate for nose drop by using the trim adjustment. This practice eliminates any nose heavy tendency and gives a better feel to the plane.

Be sure the wheels are down for ground landings and up for water landings. Indicator lights in instrument panel will not operate unless gear is locked.

Step landings may be made safely with the LAKE except under rough water conditions. In cases of rough water or where uneven or crosswave patterns exist, a full stall landing is recommended at all times.

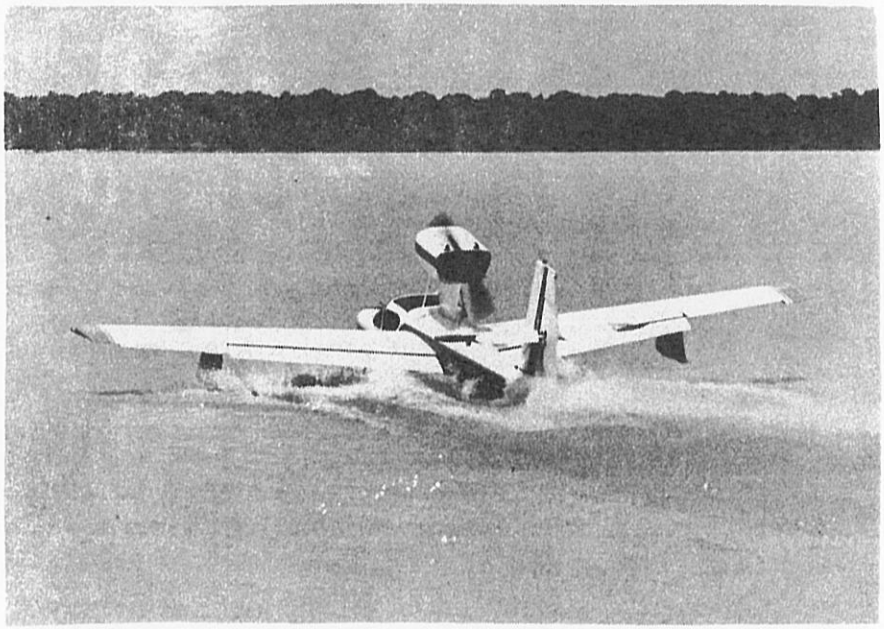
On smooth water, use a slight amount of power to set the plane down on the main hull in a flat attitude. After making initial contact with the water, reduce the throttle gradually but make no change in the elevator setting. Do not pull back on the elevator. If the plane bounces on the initial contact, ease back on the control column and execute a full-stall landing.

NEVER ALLOW THE NOSE TO DROP BELOW THE LEVEL OR LANDING ATTITUDE WHEN NEAR THE WATER. ALWAYS LAND WITH WINGS LEVEL.

In cases of cross-wind conditions, "crabbing" should be used exclusively. At the moment of initial contact, use the rudder control to straighten out the plane on its track. Do not use a "wing down" approach when landing cross wind. The LAKE handles much better in cross-wind conditions than conventional float planes. The most common errors of inexperienced pilots are . . . (1) overcontrol of the elevator;

(2) improperly applying back elevator control; and (3) allowing the ship to leave rough water before it is ready to fly.

THE GREATEST DANGER FOR AN INEXPERIENCED PILOT IS LANDING ON GLASSY WATER. Depth perception under these conditions is most difficult, and such landings require considerable practice. A safe glassy-water approach and landing is made by setting up an approach speed of 65 mph, and using enough power to control the let-down to between 100 and 200 fpm. This same approach should be used when landing at night or under conditions of poor visibility.



The hull is designed so that with the application of power the LAKE will promptly come up on the step for take-off.

WATER TAKE-OFF

Take-offs, under average load conditions, are made by keeping directional control with the air rudder. When in the take-off position, run through the checklist.

Flaps should be in the "down" position at the beginning of the run, and the elevator trim set well back toward the "up" elevator position. Advance the throttle gradually in order to help keep the windshield dry, particularly in rough water.

Practice take-offs in moderately smooth water, using the elevator to obtain the proper nose attitude. If the plane starts rocking during the take-off run, apply a slight back pressure on the yoke to stop the motion. After the plane is on the step, the hull is properly positioned for water take-off when the floor of the cabin is approximately parallel to the water, and the wings are level.

Attitude control is vital to good take-offs from rough water.

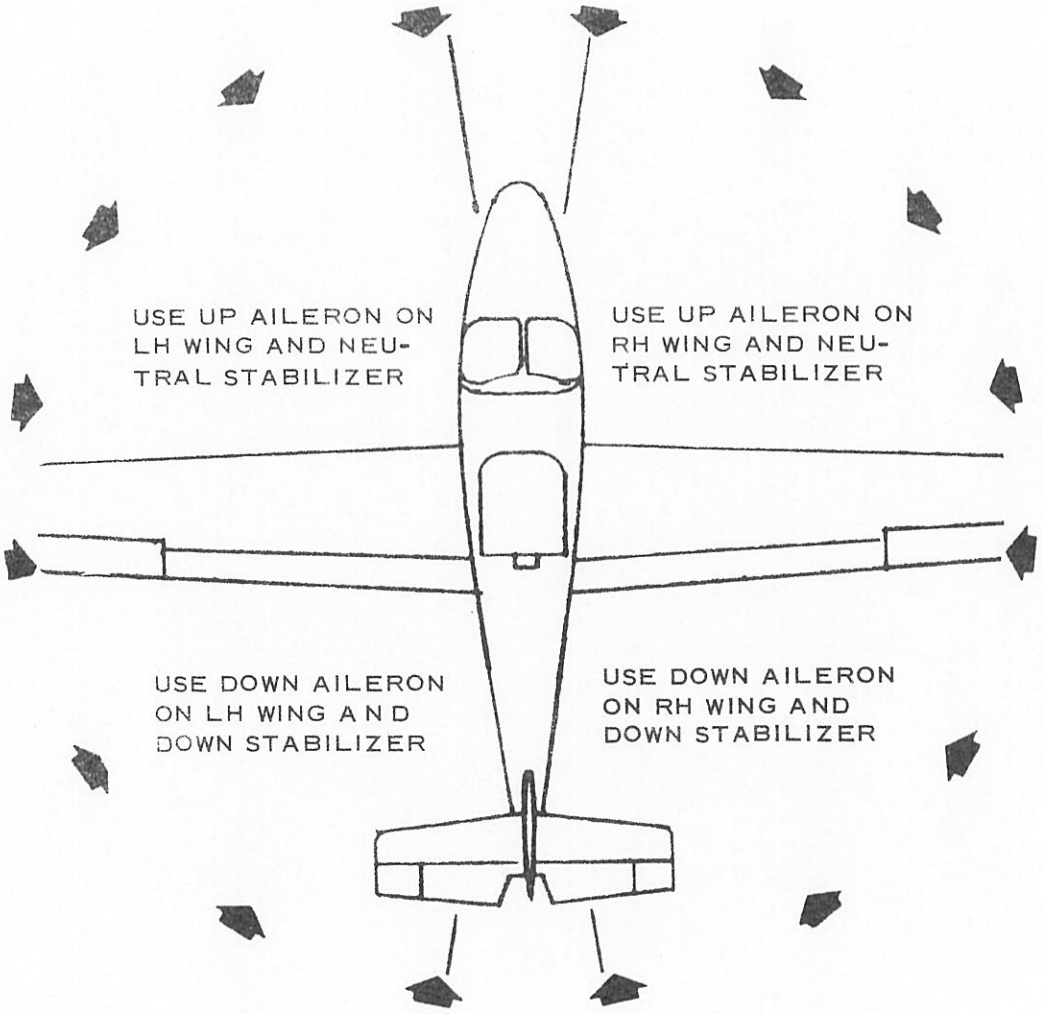
TAKE-OFF FROM WATER requires practice. Flaps may be left up until plane is on the step and then lowered. Pilots must be alert for changes in plane attitude and for obstructions on the water.

WATER TAXI

Taxiing on water requires different procedures than those followed when on land, since directional control and power settings differ. Regardless of wind velocity, best control is obtained at slow speeds.

The LAKE is equipped with a retractable water rudder that recesses into the air rudder and is controlled by the retract lever located between the seats. This provides excellent steerage when the plane is in full displacement position. The principles of water operations outlined in the Flight Training Handbook AC 61-21, should be followed. One variation to these principles is another of the LAKE's advantageous features, its ability to perform turns at step speeds without water looping or submerging a float. When the plane is on the step, directional control is maintained with the ailerons and air rudder; the water rudder is not needed.

TAXIING DIAGRAM



CODE

WIND DIRECTION

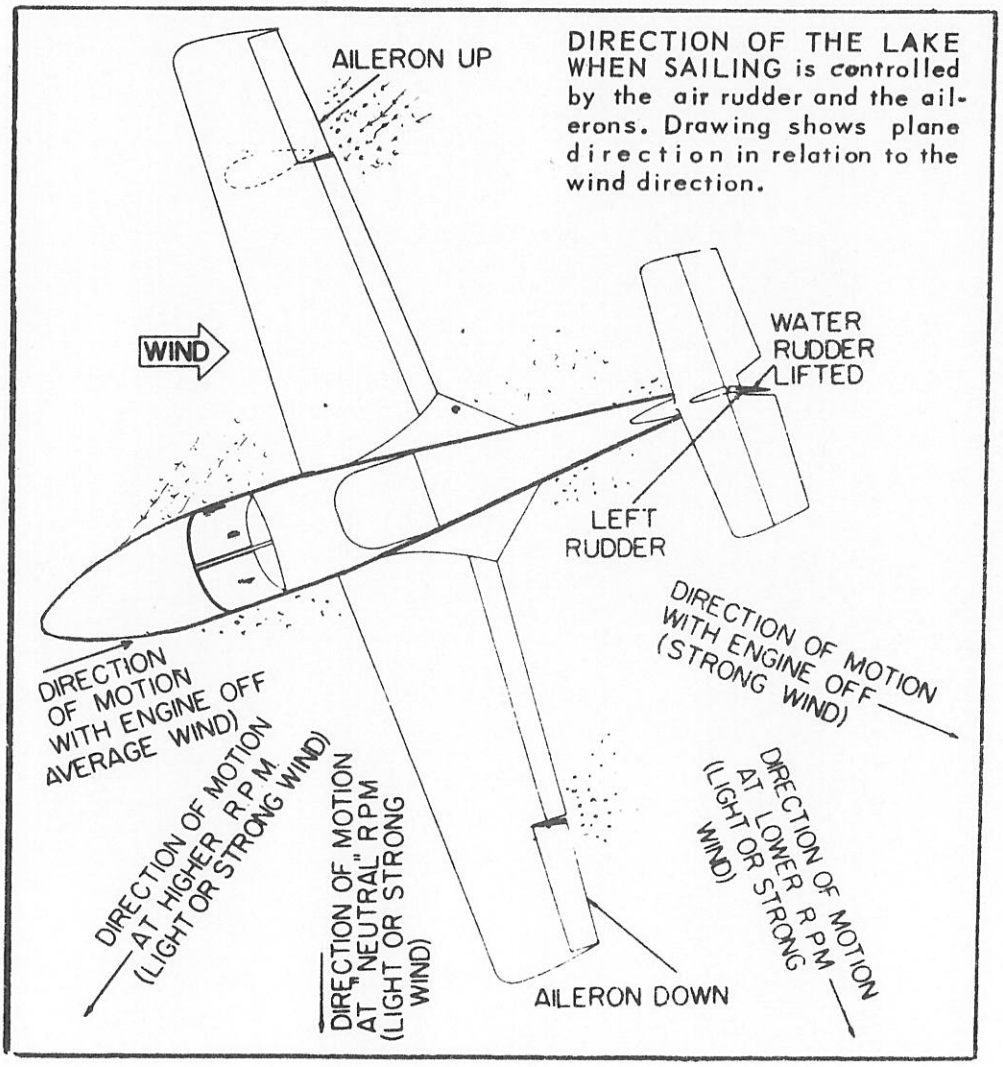
NOTE

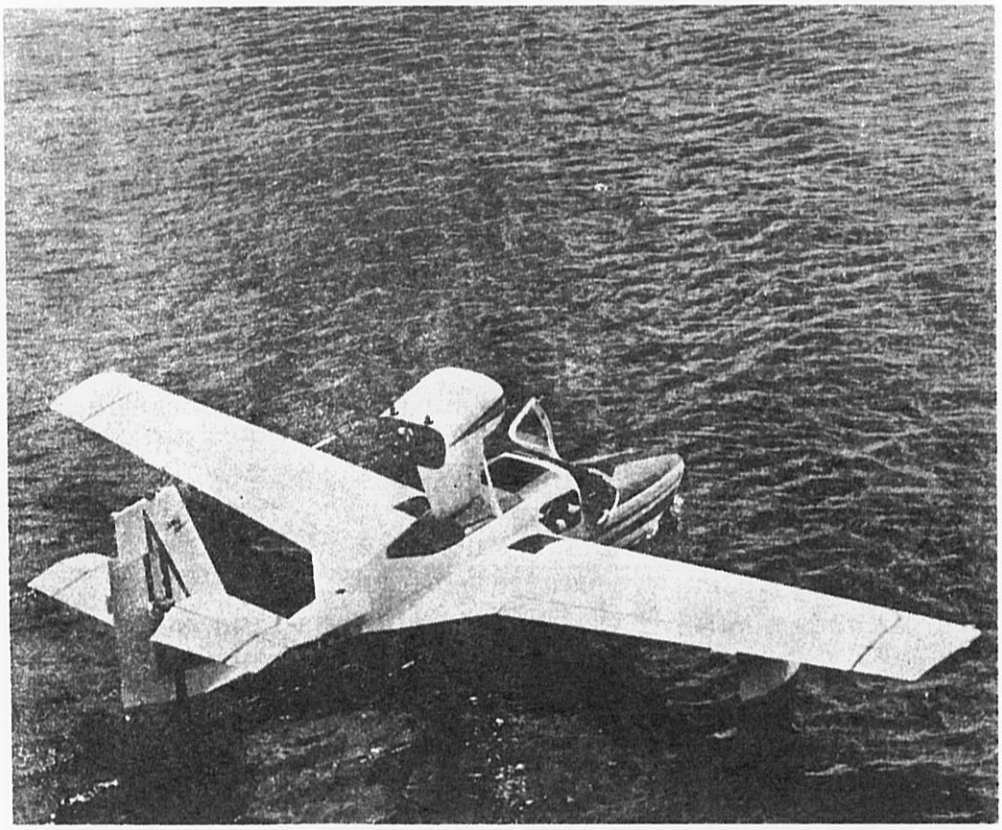
Strong quartering tail winds require caution. Avoid sudden bursts of the throttle and sharp braking when the airplane is in this attitude.

SAILING

After landing and taxiing in water, the pilot may, without turning, position the plane into a confined space by sailing, provided the slightest breeze exists. Unless there is no wind, at which time it is necessary to paddle the plane into position, the amphibian will drift when the engine is stopped, following a directional line that is resultant of the wind and water forces acting on it. This line lies in the direction to which the tail is pointed and to the side to which the nose is pointed. Full air rudder must be used to steer the plane, assisted by use of the ailerons. Speed in sailing can be varied somewhat by lowering the flaps and opening the cockpit doors. This, of course, increases projected area and the sailing speed.

When sailing the LAKE, do not attempt to steer the plane by the water rudder. Pilots should make allowances for existing water currents; otherwise, the plane may be carried into obstructions.

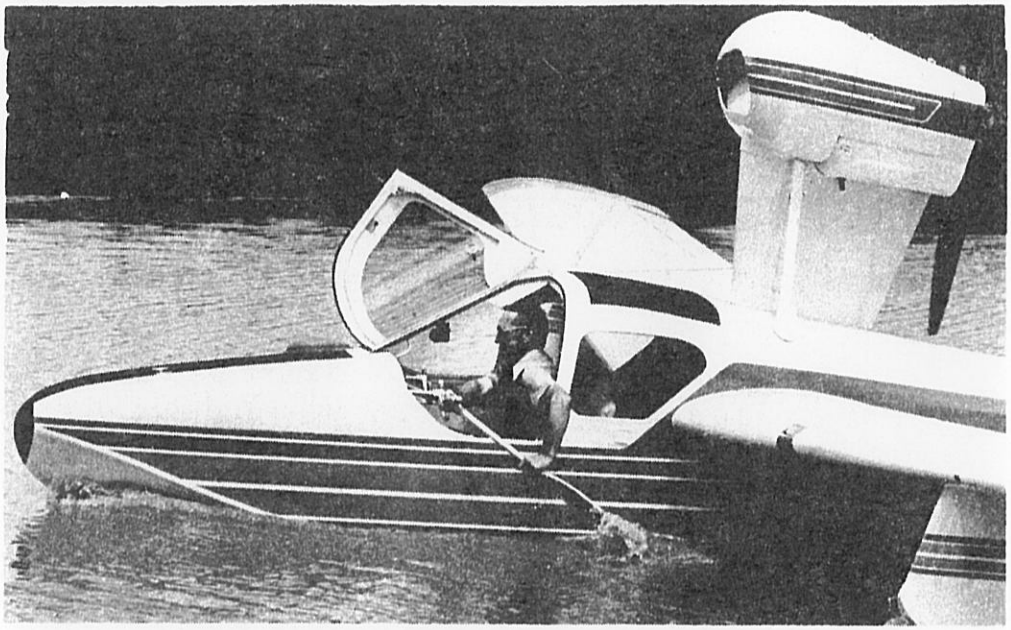




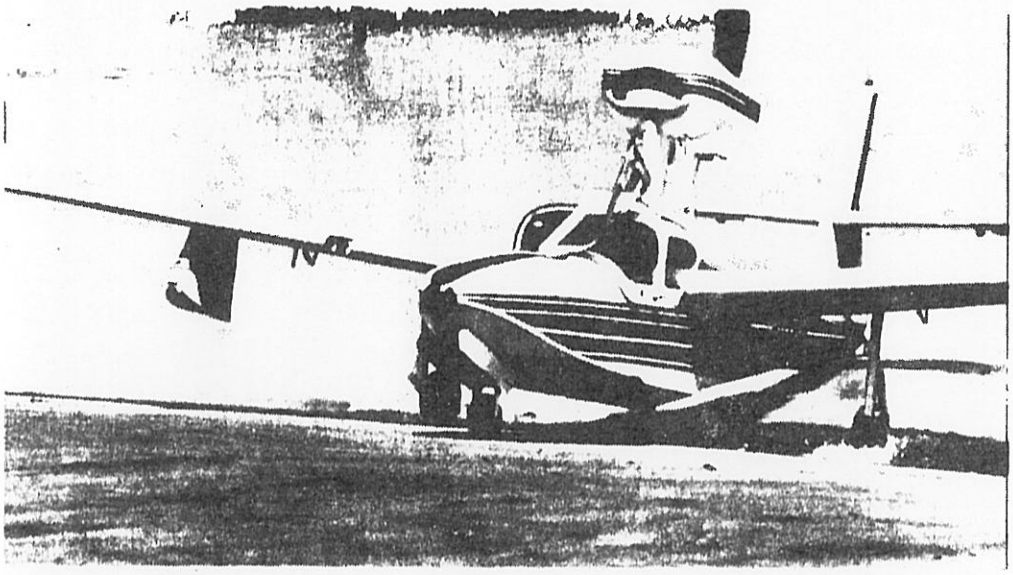
TAXIING IN WATER is not difficult. Direction is controlled by water rudder, air rudder and throttle. Wing tip floats provide good stability to plane. Note the pronounced dihedral in the wings.

MOORING

The LAKE is equipped with a mooring cleat on the bow. This is standard equipment, and should be used to tie the plane to a dock or other stationary object. However, always exercise caution when mooring the plane during strong wind conditions, as damage may be inflicted to wing tips and floats by bumping against docks and mooring posts. Float bumpers are standard on the LAKE; wing tip bumpers are optional.



The LAKE may be paddled the last few feet to the dock or shore while maintaining direction control from the cockpit.



The LAKE Buccaneer taxiing up on the beach for a safe overnight tiedown.

WEIGHT AND BALANCE

A weight and balance chart that gives the actual weight of your LAKE and the permissible center of gravity conditions is supplied with each airplane. It is recommended that pilots refer to this chart before loading.

EMERGENCY PROCEDURES

When flying in any aircraft, a pilot must be capable of initiating procedures to cope with unpredictable circumstances. These circumstances are usually referred to as emergencies, since the time element required to overcome them is brief. Some conditions can be remedied while in the air; others require precautionary landings.

Every effort has been made to insure that the LAKE is built and equipped to the highest design standards. Being capable of landing on land or water makes it inherently safer than a land craft. But if an emergency should arise, the hypothetical causes and solutions listed in TABLE V should assist the pilot in instituting the correct procedure.

The flap and landing gear light indicators mounted in the instrument panel are the "press to test" type. In cases where the lights do not function, first check the bulbs merely by pressing in on the casing surrounding the globe. If the bulb is operative, it will light when tested in this manner.

IF, DURING TAKE-OFF OR LANDING ON WATER, UNUSUAL ATTITUDES OF THE PLANE OCCUR, CUT THE POWER AND MAKE A FULL-STALL LANDING. ANY OTHER ATTEMPTS TO RECTIFY THE ATTITUDE USUALLY AGGRAVATE THE CONDITION.

Table V -- Emergency Procedures

PLANE ATTITUDE	CAUSES	RECOMMENDED PROCEDURES
Loss of power	Fuel pressure is down. Icing in carburetor. Unknown.	Turn on auxiliary fuel pump. Turn on carburetor-heat. Propeller to high pitch, extend flaps under 125 mph and glide to landing.
Landing gear will not extend	Leak in hydraulic system or re-cycling of fluid.	Cut off hydraulic pump and allow pressure on gauge to drop to zero. When gear is to be extended, put the control lever in "down" position and use the hand pump. As a final resort, look for water and land with gear up. Because of the extremely strong hull it is possible if water is not available to land on grass or snow with the wheels retracted with little or no damage.
Fire in plane	Smoking carelessly. Electrical short circuit.	Turn off master switch. Set prop in high pitch and land immediately.
Flaps will not extend	Broken or blocked hydraulic line.	Flaps are not necessary in an emergency. Instigate procedures for normal landing, allowing more distance for run in.
Control difficulties	Unexpected swells. Boat making invisible cross waves. Extremely rough water.	Cut power and make full-stall landing. Initiate new take-off under proper conditions.

SECTION II

Component Parts

ENGINE AND PROPELLER

A Lycoming direct-drive, four-cylinder, air-cooled internal combustion engine provides 180 or 200 hp at 2700 rpm. The 180 hp LAKE LA-4 utilizes the O-360-A1A, and the 200 hp LAKE BUCCANEER, the I0-360-A1B. These engines are mounted on a support designed to offset side, front, and aft loads of an excessive nature. This support consists of a high-strength welded frame covered with metal sheathing. Although this covering is removable for maintenance and inspection, it must be in place before flying the aircraft, since it is designed to provide strength to the entire mounting.

The maximum permissible cylinder head temperature measured with a bayonet type Thermocouple is 500° F. Maximum permissible magneto temperature measured at a coil hold-down screw is 180° F. A thermometer well is provided in the accessory housing for measuring the oil temperature.

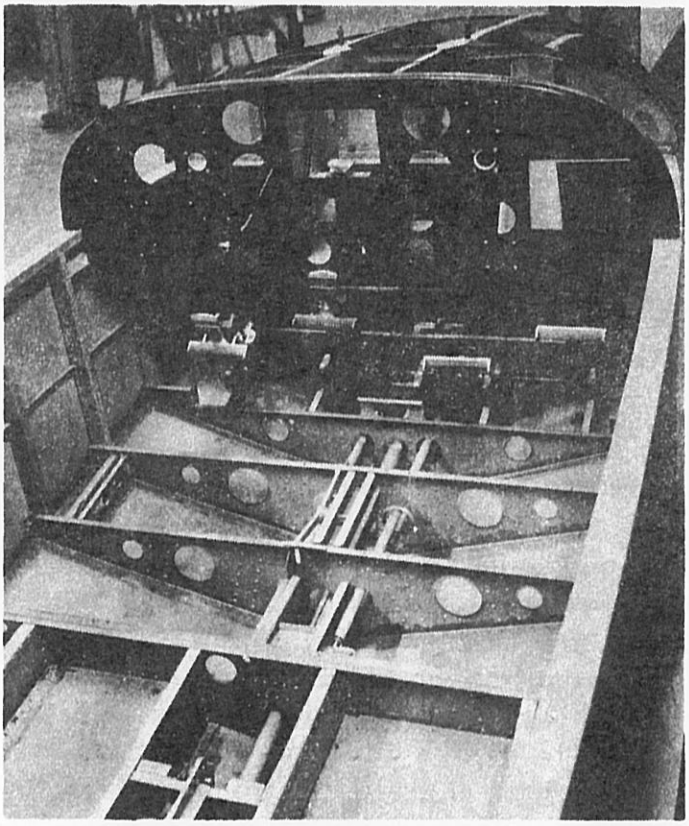
The plane is equipped with a Hartzell Constant-speed, variable pitch pusher propeller having a diameter of 72 inches on the 180 HP versions and 74 inches on the 200 HP BUCCANEER. A pressure up to about 200 psi is supplied to the pitch control mechanism by a Hartzell governor mounted on the engine. Oil pressure increases pitch while aerodynamic force decreases it. Consult Hartzell Propeller Specifications for exact settings for your propeller. The hub parts are made of alloy steel forgings; the piston and blades are aluminum alloy forgings. All blades are pivotally mounted on a hub spider for pitch change. Blade clamps secure the blades to the hub assembly. The pitch actuating mechanism is linked to the base of each clamp by means of a pin or screw.

HULL AND WINGS

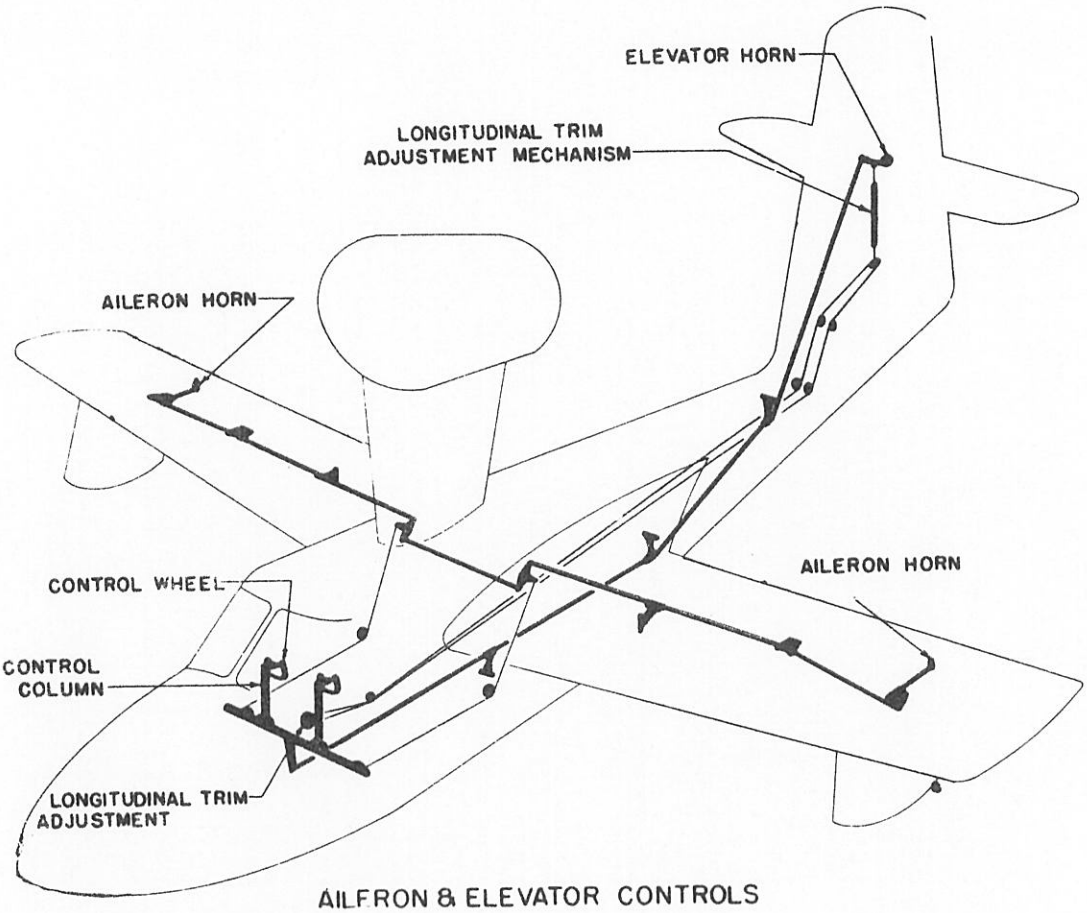
The design of the LAKE hull is similar in many respects to fighter aircraft. Made of 2024-T3, high-strength aluminum framing covered with a metal skin, the structure provides a high factor of safety. All aluminum parts are individually factory treated against corrosion with a chromic-acid etch and zinc-chromate primer. Exposed steel parts are cadmium plated and primed with zinc-chromate.

During manufacture, all hull seams are sealed with a neoprene type material. Finally, the hull is subjected to a thorough water test at the factory. A high-strength aluminum alloy, 7075-T6 is used for the hull bottom, so that forces encountered in water landings will be distributed without distortion of the structure.

The wing consists of a main spar, auxiliary spars, and ribs covered with a load-carrying skin firmly riveted together. Attached to the fuselage by heavy steel fittings, a wing may be removed in minimum time by removing a few bolts. Slotted flaps extend for 60 percent of the wing span and are operated hydraulically. Floats, rigidly bolted to the underside of the wing, are designed to provide maximum stability on water take-offs and landings.



STRUCTURAL DESIGN OF HULL will withstand excessive punishment. All seams are sealed twice and the hull is then water tested. Note the horizontal and vertical structural members that give rigid support to the hull.



AILERON & ELEVATOR CONTROLS

CONTROLS

The LAKE is equipped with dual controls as standard equipment. The yokes are on push pull tubes that extend through the instrument panel.

Both flaps and landing gear are hydraulically actuated by functionally shaped levers; that is, the landing gear control is wheel-shaped and the flap control is airfoil-shaped. The rudder and elevators are actuated through push-pull tubes. The ailerons are moved by push-pull tubes in the wings. This system requires no adjustment under normal use nor does it require any lubrication. Future field adjustment is unwarranted. The design includes a minimum of play. This feature coupled with the low friction bearings used at pivot points, provides an extremely smooth control system.

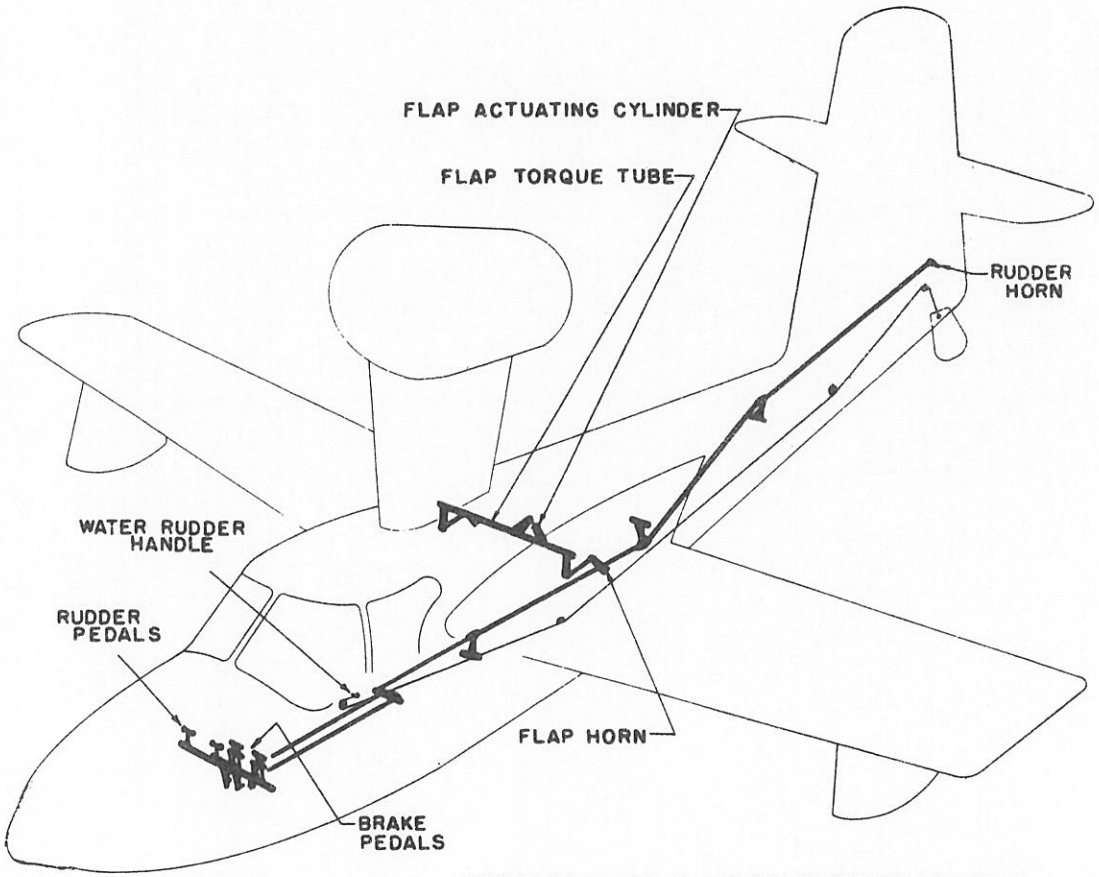
The longitudinal trim is operated hydraulically and is actuated by a lever located between the two front seats.

Retracting into the air rudder, the water rudder is fastened to an individual cable for up or down actuation. It is steerable by rudder pedal control. Recommended cable tension for the cable portions of the aileron system is 22 to 28 lbs.

The cables ride on antifriction pulleys attached to the frame by sheet metal brackets.

The engine cowling is hinged at the top, swinging up and back to provide access to the engine. Equipped with a strong double latch and spring safety arrangement, the cowling will remain secure in the strongest wind; however, it is recommended that pilots check the cowling prior to taxiing, as an unlatched cowling can foul the propeller.

The forward hatch contains an access hole for the nose wheel mechanism and a container for lines and ballast. Nylon rope is provided, and it is recommended that adequate scope be given when mooring the plane.



RUDDER, FLAP, & WATER RUDDER CONTROL

HYDRAULIC SYSTEM

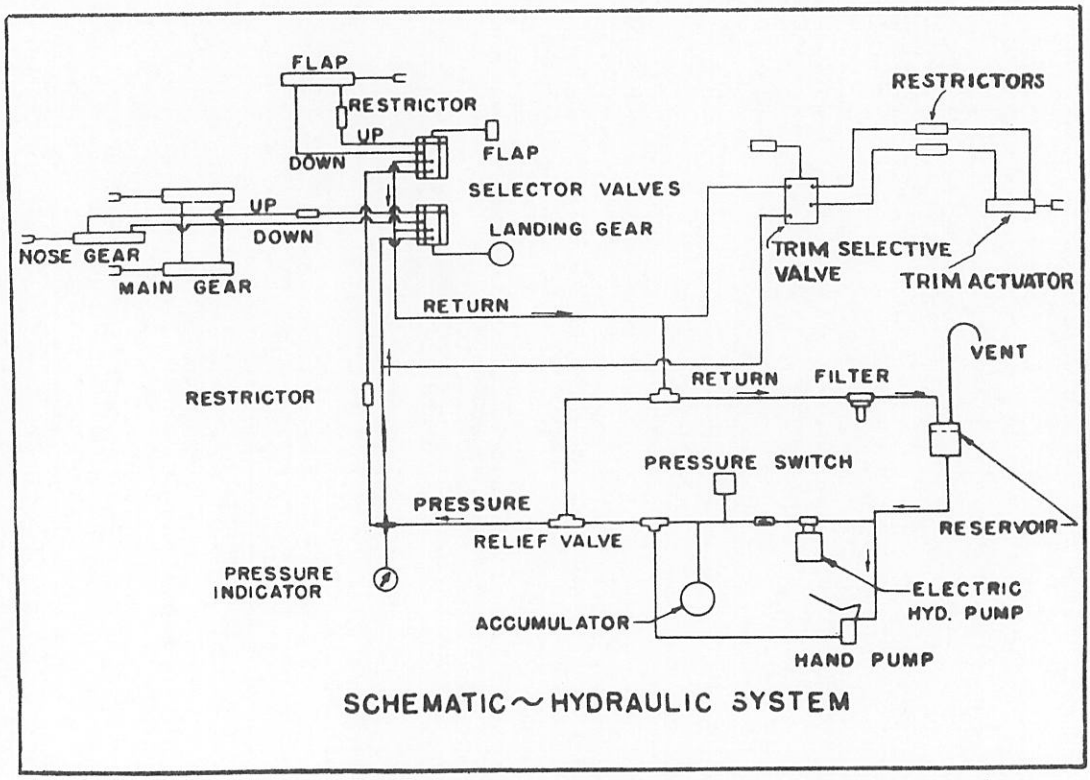
Used to operate the landing gear, flaps, and longitudinal trim, the hydraulic system is composed of an integral pump and electric motor unit, pressure limit switch, accumulator, and reservoir, interconnected by necessary piping, check valves, and restrictors.

The reservoir, accumulator, pump and motor are positioned ahead of the instrument panel.

Hydraulic fluid is type MIL 5606 and is red in color. Rigid portions of the tubing are externally coated with zinc-chromate primer and clamped to bulkheads or other supporting structure. Where flexibility is required, the tubing is made of a rubberized synthetic material capable of withstanding more than 1500 psi. All connections are coupled with fittings that meet Army and Navy specifications. A dip stick in the reservoir tank provides an easy check on the fluid level.

A pressure relief valve guards the system against excess pressure, while replaceable filters keep the fluid free of foreign matter.

A hand pump, located at the center of the instrument panel is provided to build up pressure manually for servicing or if the electric pump fails to operate.



SCHEMATIC ~ HYDRAULIC SYSTEM

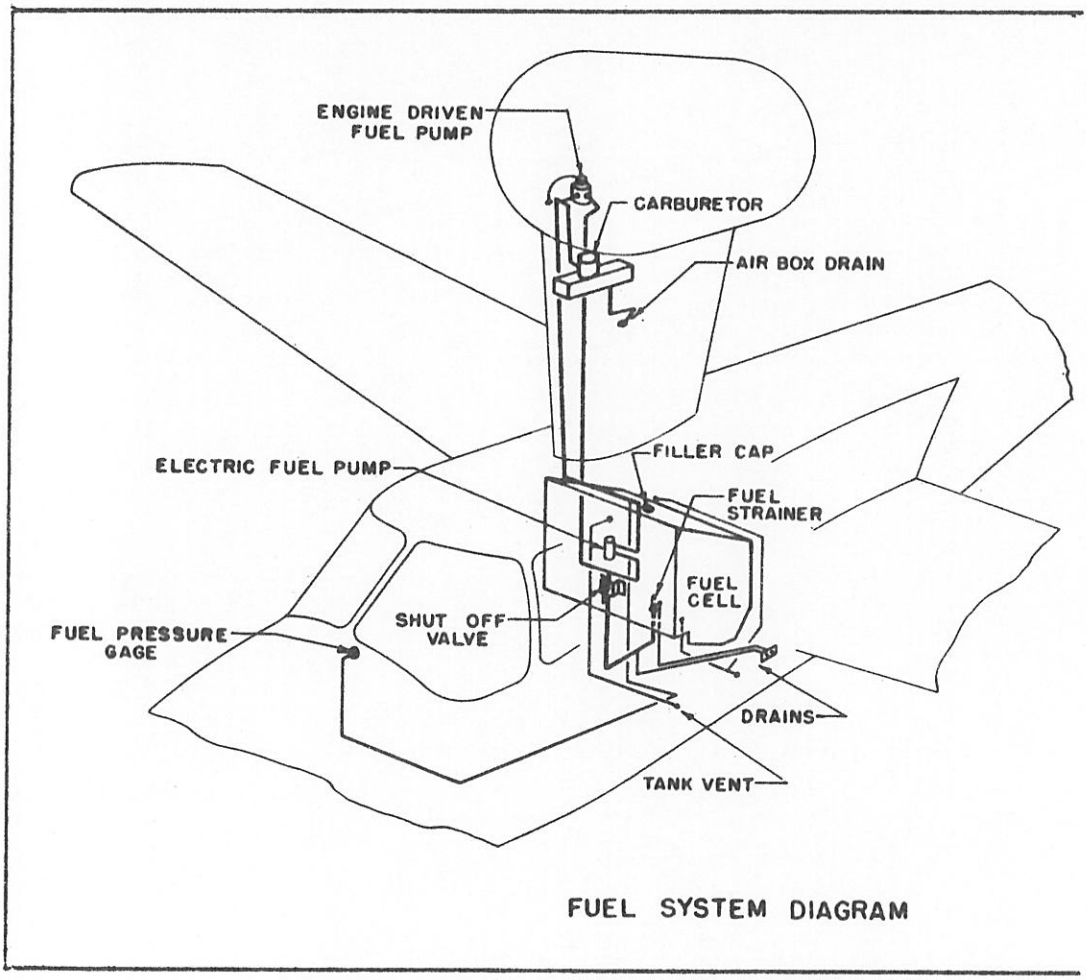
HYDRAULIC SYSTEM is operated by a pump and motor unit. Relief valve guards against overpressure and hand pump is installed in case of electrical failure.

FUEL SYSTEM

A 40 gallon capacity gas tank equipped with a Mareng Bladder type fuel cell is located behind the rear portion of of the cabin in the upper mid-section of the hull. The tank is bounded by and supported from the major bulkhead structures.

Two drains located on the left-hand side of the hull under the wing provide system and sump drainage. A strainer for the entire fuel system is provided in the fuel outlet line at the tank. This strainer is removable and should be checked periodically for dirt accumulation.

Since the engine on the LAKE is located overhead, an auxiliary fuel pump is used. Electrically driven, this pump provides positive flow to the engine and meets FAA capacity requirements. To avoid excessive wear, it is recommended that the auxiliary fuel pump be shut off during cruising flight. The engine-driven pump is a diaphragm type. Operation of this pump is dependent entirely upon the engine.



FUEL SYSTEM DIAGRAM

FUEL SYSTEM has two pumps. The auxiliary is electrically operated and the main pump engine operated.

ELECTRICAL SYSTEM

The electrical circuit breaker panel and most of the switches are located on the left hand side of the cockpit. The circuit breakers cannot be overridden. The proper circuit breaker reset procedure is to wait for thirty seconds after the circuit breaker has opened and then push in the reset button. If the electrical system has no malfunction, the breaker will remain closed.

A 12 volt, 34 ampere hour battery provides ample current for the LAKE. It is located in the baggage compartment on the right hand side of the plane, easily accessible for inspection.

The starter button is positioned on the lower left-hand side of the instrument panel. It is a "push-in-to-energize" switch.

A rheostat controlled dual purpose interior and instrument light is mounted in the roof of the cabin.

Switches for plane lights are grouped on the circuit breaker panel and are all placarded. Taxiing and landing lights are located in the leading edge of the left wing.

Required voltage is maintained through the use of a voltage regulator located on the right-hand side of the engine mount accessible from the forward cowling.

LANDING GEAR AND BRAKES

The landing gear struts, fabricated from chromium-molybdenum steel, are welded, heat-treated, and primed prior to final painting. A strong structural arrangement, trouble-free operation and easy maintenance result from this simplicity of design. Loads imposed on the gear are absorbed by the oleo strut and transmitted to the structural members of the wing. The landing gear is retracted hydraulically, with the cylinder being mounted on the gear frame in the wheel well. Both the nose gear and the main gear operate simultaneously.

The position lights on the instrument panel will not function unless all three wheels are up and locked or down and locked.

Points of lubrication for the landing gear are located on the assembly as necessary. It is recommended that the lubrication chart be used as a guide for lubricating the gear and that all moving parts be lubricated.

The landing wheels are lightweight aluminum and must be replaced with wheels of the same metal, the use of magnesium wheels will result in severe electrolytic corrosion during salt water operation. Tire sizes are 600 x 6 in. on the main gear and 500 x 4 on the nose wheel.

Oleo-type shock absorbers are provided for the main and nose gear. The oleo is mounted in the nose wheel strut and forms an integral part of that assembly, while the main gear oleos are attached between the strut and the wheel assembly, providing "knee action" operation. A decal attached to the oleo is stamped with filling procedures and fluid specifications.

Table VII -- Lubrication

PART	FREQUENCY		TYPE OF LUBRICANT
	Salt Water	Fresh Water	
Control hinge surfaces	Weekly	50 hrs	Paralketone or heavy-duty grease
Wheel bearings	Weekly	50 hrs	Per manufacturer's specification on decal.
Landing gear	Weekly	50 hrs	Marfak heavy-duty, water resistant grease.
Propeller	50 hrs	50 hrs	a. Lubriplate 630 AA Fiske Bros., Toledo, Ohio For lubrication of the blade pilot tubes only. b. Stroma HT-1 (Z-801 Grease) Union Oil Co. of California (All parts). c. Gulflex A For lubrication of blade ball bearings. d. RPM Aviation Grease No. 2 Standard Oil Co. of California (All parts)

ACCESSORIES AND RADIO EQUIPMENT

Various types and makes of radio equipment are obtainable for installation in the LAKE. Space has been provided in the center of the instrument panel to install radio equipment at the factory or in the field. If the installation is extensive, be sure to follow the FAA weight and balance charts to obtain proper loadings.

Cutouts are provided in the instrument panel to accommodate additional instrumentation. Such equipment can be supplied by Lake Aircraft Corporation upon request.

CABIN FEATURES

Entrance or exit is through canopy doors hinged to move upward about the center of the plane. The canopy blends into the fuselage and is firmly secured when latched. It may be key locked from the outside. Entrance steps are mounted on the hull at each side of the cabin area. The insulated cabin area comfortably accommodates four people, or if desired, the rear and right front seats can be removed to provide space for up to 500 lbs. of luggage. Baggage tie-downs are standard equipment. The front seats are individually adjustable to comfortably seat tall or short people.

The instrument panel is fabricated in one piece and provided with cutouts for standard and accessory instruments. Instruments are listed in Table VI with their respective locations.

Ample space is provided for the installation of additional instruments or controls, such as radio and navigational equipment.

Well-tailored, washable materials are used in the vinyl upholstery of the cabin and are available in various color combinations. All color schemes blend in with the modern design of the airplane and provide pleasant and light surroundings.

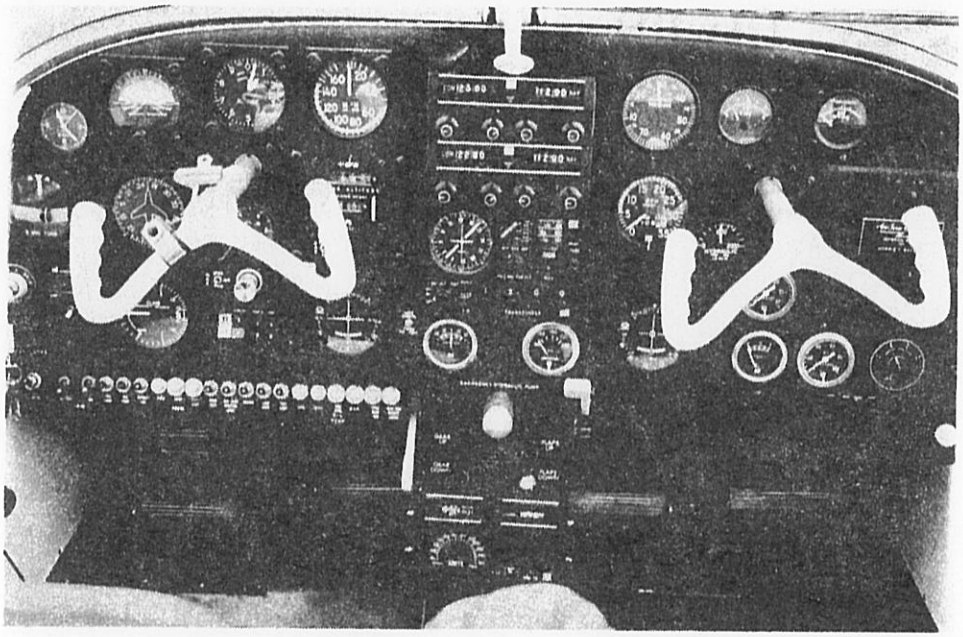


Table VI -- Cabin Instruments

Left-hand portion of instrument panel (Provision for Blind Flying Instruments)	(1) Magnetic compass (2) Air speed (3) Altimeter (sensitive) (4) Fuel pressure gauge (5) Rate of climb
	(1) Stall warning (2) Fuel gauge (3) Tachometer indicator (4) Manifold pressure gauge (5) Hydraulic pressure gauge (6) Ammeter (7) Oil temperature gauge (8) Oil pressure gauge
Right-hand portion of instrument panel (Provision for Engine Hour Meter & Head Temperature)	
Overhead	(1) Carburetor heat control (2) Propeller pitch control (3) Mixture control (4) Throttle

SECTION III

General Maintenance

LEVELING

Jack-pads are located under each wing. The tail skid or the tiedown may be used for jacking. The center of gravity is close to the wing jack-pads and consequently the front or tail ends of the plane should be blocked.

The longeron on either side of the cabin may be used for fore and aft leveling, and lateral leveling obtained by laying a straightedge across the two longerons.

CONTROL SURFACE ADJUSTMENT

The angle of control surface travel is as follows:

1. Aileron	Up 29° + 2° - 1° Down 15° ± 1°
	Neutral position tolerance ±2°
2. Elevator	Up 26° Down 23°
3. Rudder	Right 25° Left 25°
4. Flaps	Down 20°
5. Trim	Up 36° Down 24°
	Tolerances ±1° except as noted

All portions of the control system that are push-pull systems are preset at the factory and it is suggested that they be left alone. Cable tension can be re-set by adjusting the turnbuckles.

CANOPY AND WINDOWS

The following steps are given as a guide to proper care of the plexiglass windows:

(a) Flush with water and remove excessive amounts of dirt.
(b) Wash with warm water and soap.
(c) Remove water resistant matter with a cloth soaked in kerosene. Do not use gasoline, alcohol, benzene, carbon tetrachloride, lacquer thinner, or window cleaner sprays.
(d) Finally, apply a light coat of hard wax and rub lightly.
(e) A severe scratch can be removed by rubbing with jewelers rouge. Then smooth the surface and apply conventional wax.

PROPELLER

Nicks in the blade leading edges should be filed out and edges rounded to avoid potential cracking. It is suggested that reference be made to the FAA manual on propeller care. Do not allow steel hub parts to become rusted or corroded. If necessary, touch up exposed spots on the hub with aluminum paint or have the hub replated.

BATTERY

An Exide 12-V, 34-ampere battery installed in an integral box is located in the right-hand forward section of the baggage compartment. Fluid level should be checked periodically. If the battery is to be recharged, start with a rate of 4 amps and finish with 2 amps. The master switch must be off during a quick charge.

HULL

The hull bottom is equipped with plugs to permit the draining of water that may be forced into it. It is recommended that following extensive amphibious operations these plugs be removed and any trapped water be allowed to escape. However, REMEMBER TO REINSTALL THESE PLUGS IMME-

DIATELY AFTER DRAINING THE HULL. Also, weep holes are provided in the bottom edge of the bulkheads to prevent trapping water in any one compartment. These weep holes should be cleaned out periodically with a piece of wire.

After salt water operation, your LAKE should be washed down with fresh water to minimize the possibility of corrosion. All grease fittings should be greased as per Table VII.

BRAKES - - BLEEDING AND ADJUSTMENT

Brakes may be bled by removing screw in wheel, applying hydraulic fluid with an oil can that has been fitted with a piece of tubing to fit screw hole for pressure, and continue filling until brakes become firm. Care should be taken that can does not empty below ¼ full and air is pumped in.

TIRES

The nose wheel tire is 500 x 4. Main wheel tires are 600 x 6. Correct air pressure for main gear tires is 30 pounds. Main gear tires should be interchanged occasionally to minimize uneven wear. Nose wheel tire pressure should be maintained at approximately 15 pounds.

FUEL REQUIREMENTS

The Lycoming Engine 0-360 uses Aviation Grade 100/130 octane gasoline. The fuel pressure gauge is marked to indicate the desired fuel pressure range.

The drains from the fuel sump and system should be opened for a brief period of time prior to flying (see Preflight Instructions). Both of these drains are located on the left-hand side of the hull.

The fuel tank in the airplane should never be allowed to get dry as the synthetic rubber fuel cell will then deteriorate. It is recommended that a minimum of one or two gallons of gas always remain in the tank; however, when desired, the tank may be left dry if the inside of the fuel cell is coated with a light film of SAE 10 or SAE 20 engine oil. The oil system of the engine contains eight quarts but will operate

on a minimum of two quarts. Engine oil should be changed every fifty hours, or sooner under adverse conditions.

The following grades are recommended for specified temperatures:

Over 40 deg F	SAE #50
Below 40 deg F	SAE #30

The maximum oil pressures are as follows under specified conditions.

Minimum Idling	25 psi
Normal	60-85 psi

100-HOUR INSPECTION

All 100-hour inspection procedures for the LAKE and methods of disassembly for the various parts are similar to other aircraft. Prior to starting the inspection, be certain that all items to be inspected are cleaned and that proper tools are available for the job. Insufficient equipment will result in damaged parts or incomplete inspection. Use a regular inspection system while working and do not deviate from it. The FAA inspection check form is invaluable. At all times a workman must employ proper safety precautions.

Do not hurry during the inspection. Flying performance and safety may depend on the 100-hour inspection. Use enough time to thoroughly inspect each item. Never omit checking the few parts that are difficult to get at, and never take a chance on a part that looks suspicious. Finally, do not attempt to accomplish work that may require complex inspection procedures or exceptional skills unless you are qualified.

Although the LAKE is well constructed, and exposed parts treated to withstand corrosion, it is wise to carefully examine the parts that are consistently exposed to salt water. After use in salt water, pilots should see that the plane is washed down with fresh water.

It is recommended that the requirements and methods outlined in the FAA Manual No. 18 be followed in their entirety.

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