Seawind Flying

From Seawind North America, Corp. (SNA)

Sections:

1. Introduction
2. Flight Characteristics
3. Flying on land
4. Flying on water

Introduction

The Seawind is a versatile, fast amphibian introducing the thrill of water flying to many, while offering those familiar with water flying an expansion of water flying capability. With the Seawind, it is possible to leave a base and fly 400 NM to a week's fishing in Canada and return to home base without refueling. This can be accomplished while taking off and landing on the water at either or both ends of the trip. This section of the web site will deal with gaining the skill and confidence to perform this kind of flying routinely.

Flight Characteristics: All airplanes have a great deal in common but have native characteristics usually derived from their engineering and geometry which differentiate them. The primary idiosyncrasies of the Seawind which we will deal with here are high thrust line, thick vertical stabilizer and main wheel location.

HIGH THRUST LINE: The high thrust line of the Seawind is its most important characteristic and accounts for most of the difficulty initially experienced in flying the airplane on land or on water. Most of us are familiar with flying airplanes whose thrust line is incident (or close) to the longitudinal line going through the center of lift of the wing. When you add power the nose pitches up. When you reduce power the nose pitches down. The Seawind acts opposite of this and this takes a little getting used to.

In addition, the high thrust line is responsible for adverse yaw, which requires positive use of the rudder in leading coordinated turns.

VERTICAL STABILIZER Probably because of structural requirements to support the 500# Lycoming IO-540 (preferred power plant) and its thrust, the vertical stabilizer is unusually thick, and this has a significant blanking effect on the rudder.

MAIN LANDING GEAR: The main landing gear are close together (narrow track) and a significant distance aft of the center of pressure of the wing.

These characteristics work sometimes alone and sometimes together to make learning to fly the Seawind something of a challenge when compared to the average Cessna or Piper, and even the venerable Lake Amphibian. The purpose of this discussion is to make this learning experience somewhat less exciting (alas!) than it can be but presumably

significantly safer. We can then enjoy the tremendously rewarding thrills the Seawind offers on the water.

FLYING THE SEAWIND ON LAND

TAKEOFF

The high thrust line and aft location of the main landing gear make land takeoffs different from what we have all been used to. The preferred technique has evolved to the following:

Assuming a center of gravity between 140 and 141, flaps set at 20 degrees, and appropriate elevator trim, the yoke is pulled to the aft stop before application of power. During the takeoff run maintain directional control with a combination of nose wheel steering, brakes and rudder (in that order) and wings level with ailerons. After making sure that the nose wheel is centered, smoothly (2-3 second duration) apply full power. At 50-55 KIAS (I will deal exclusively in knots and nautical miles throughout. If your plane is instrumented for statute miles per hour, please convert these numbers) the nose wheel will lighten and start to skip. Reduce back pressure to the "sweet spot" (learned by practice) and the plane will fly off normally. The previous procedure left the yoke neutral until 60 KIAS, then pulling the yoke to the aft stop to get the nose moving up. Once the main wheels left the runway, the plane was in a seriously over rotated condition and required significant forward pressure to stay out of the stall. This still works but the new procedure is less exciting and just as effective. Thanks to Dean Rickerson for this refinement.

LANDING

There are a number of different techniques which may be used for landing the Seawind on land, from porpoising on the nose wheel (and usually breaking something) to landing so slow that the tail contacts before the main wheels (another needless repair job). The following technique intends to be compatible with water landings and will prevent either of the two extremes above.

With the gear down and full flaps, maintain 80 KIAS at the 90-degree (base leg) position in your landing pattern. Slow to 75 KIAS on close final and smoothly and slowly reduce the power to idle at about 20 feet of altitude. This **smooth** reduction of power combined with ground effect will reduce your 500 feet per minute descent to 200-300 FPM and cushion your touch down with little to no deliberate flare on the part of the pilot. One small balloon can be dealt with but if you have a large oscillation, or two small ones, **go around**, being sure to anticipate the nose down moment with power application.

FLYING THE SEAWIND ON THE WATER

Most of the mischief that has been and will be done in the Seawind will be done on the water. I will take a more elementary approach with Seawind water flying, since even

among seaplane pilots (especially in amphibian aircraft) little time is actually spent on the water.

The best way to become comfortable with your Seawind on the water should be part of your initial checkout; that is, to ramp it into the water if at all possible. Bring a buddy with you the first time, who can check out the back very thoroughly for water leaks. This done you can check the function of your water rudder. Before entering the water, you should have set your engine idle to 500 RPM, under no circumstances greater than 600 RPM. You also have taken all the slop out of your water rudder and given yourself 50 degrees or more deflection in the starboard direction and 45 degrees or more to port. Confirm that the rudder is all the way down and forward. It has a tendency to kick up 10-15 degrees without us noticing it thereby reducing water rudder effectiveness by about half. If it was turning well and now isn't, check the water rudder completely down.

Slow taxi is called displacement taxi (as opposed to step taxi which will be discussed later). Never exceed 1000 RPM while in displacement taxi. We must remember that when the engine is running on the water, the airplane is moving. The brakes don't work on the water and slow speed control can be very critical. The preferred method of engine shut down is still mixture to cutoff, but both magnetos off works in an emergency. Another trick for slowing down on the water is to turn one mag off.

After entering the water, ensure the plane is floating and the wheels are clear of the bottom and raise the gear. When you are sure that you have four to five feet of depth, lower the water rudder. Immediately check for directional control and be prepared to shut down if necessary. Have your paddle at the ready. The water rudder is fragile and any contact with the bottom is likely to result in a repair job.

STEP TAXI

When you are ready to step taxi, point the nose 5° STARBOARD of the wind, ensure that the gear are up, the flaps are set at 20° and yoke is neutral. Just before power application, RAISE THE WATER RUDDER. Smoothly (3-4 seconds) increase throttle to full power setting. The nose will start rising and when it stops rising the airplane will begin climbing up onto the step. As it climbs onto the step, the bow wave will start a porpoise. Use back pressure to stop the porpoise and ease the nose back down to the "sweet spot". Since we are only practicing step taxi, reduce power to about 18" manifold pressure approaching 40 KIAS and adjust power thereafter to maintain 40 KIAS. 38 KIAS is too slow and 43 is too fast. Practice this in water of no more than 4" of chop until you are very comfortable with what 40 KIAS feels and sounds like. Keeping speed carefully at 40 KIAS, practice step turns as follows:

ALWAYS use rudder for directional control and ailerons for wing position between 10° port wing down and 10° starboard wing down during step maneuvering on the water. If you begin to feel uncomfortable, reduce turn rate with the rudders, while reducing power to idle and holding the nose position. When coming off the step, turn rate should be zero and wings level. Power should be smoothly reduced to idle while pulling yoke back gradually as speed decreases until yoke is against the back stop as the

aircraft falls off the step. Put the water rudder down and test steering. This procedure is the same whether terminating step taxi practice or landing. I can't overstress the importance of step taxi practice in chop conditions up to about 6" for the competent Seawind pilot. The cross-controlling involved in step taxi in wind will go a long way towards water mastery of your aircraft.

TAKE-OFF

Now that you have gained some level of comfort in the airplane on the water, it is time for your first take-off. The procedure is the same as for step taxi up to a point. Be mindful that you may have to correct for porpoise as many as three or four times before getting airborne. Here we go:

Nose 5° starboard of the wind, gear up, 20° flaps. IMMEDIATELY before advancing smoothly to full power, water rudder up. Nose will start climbing and when it stops the aircraft will begin climbing onto the step. The bow wave will induce a porpoise, which is stopped by BACK PRESSURE. When porpoise is stopped, relax back pressure, placing nose in the "sweet spot". Repeat as often as necessary. If it becomes exaggerated, hold your nose position while smoothly reducing power to idle and come off the step as illustrated above. Assuming you have the porpoise under control and are accelerating in the "sweet spot", the aircraft will come off the water at 60-65 KIAS. Because of the smooth hull and the resultant surface tension, the aircraft has to be flown off the water. Accelerate to 90 KIAS, raise the flaps and you're on your way.

One note on the water rudder before we start water landings: it is necessary to provide for a positive lock for the up position of the water rudder. If you do not, it will auto lower on a bounce and depart the aircraft on the subsequent bounces.

WATER LANDINGS

Of all the maneuvers you will perform in your Seawind, water landings provide the greatest opportunity for damage to your aircraft and injury to yourself and other occupants. It is a great idea to approach them very cautiously and study up on the techniques as much as possible. A seaplane rating with practice in a Lake Buccaneer or Renegade is also excellent preparation.

The magic number for touching the step (the aft part of the forward hull), is 60 KIAS (or 68 MPH). If you are appreciably faster than this, the nose will have a tendency to dig in. If you're slow (even 58 KIAS) the airplane will bounce nose up with any appreciable chop. Either of these scenarios complicates the landing solution. How do we get to a nearly "0" sink rate touchdown on the step of the airplane at 60 KIAS? As follows:

Make sure the landing gear is up and the flaps are set at 20°, fly 80 KIAS in the pattern to the 90° position (base leg). On final, lower flaps to full down and gradually decelerate to 70 KIAS, trimming for 70 KIAS, keeping a little power on the airplane. The power at the flare transition should be sufficient to maintain 300-400 FPM sink rate at 70 KIAS. At 10-20 feet of altitude, ease about ½ of the remaining power off and smoothly flare to a touch at 60 KIAS. Once the aircraft is on without bouncing, reduce power to

idle, come off the step and lower the water rudder. Note of caution: If your flap/aileron mixer is not disabled, be very cautious about using full flaps in any situation.

The following rules are absolutely crucial if you are to avoid burying the nose of the Seawind in the water at high speed:

1. Anytime the step touches the water the direction of the nose travel must be either static or coming up, preferably rotating up.
2. The only time you can ease nose pressure down is when the step is in contact with the water; NEVER when airborne and close to the water.

This dictates the following procedures in the event of a bounce. If it's a small bounce (2-3 feet), establish the 60-knot attitude (the aircraft will be slower), and re-contact at this attitude. Usually three total bounces are required to make the airplane stick on the water. A slight addition of power (2-3 inches manifold pressure), reducing before touchdown, will help. If the bounce is larger than this, climb up to 30 feet, reestablish the profile and try again. If your lake is small, go around and try again.

The key here is that on the water significant nose movements down can be disastrous and back pressure is your friend. It is much better to mush in on the tail from 10 feet in a near stalled condition than to chase the nose up and down and run the risk of burying the nose.

Revised 6/19/2008

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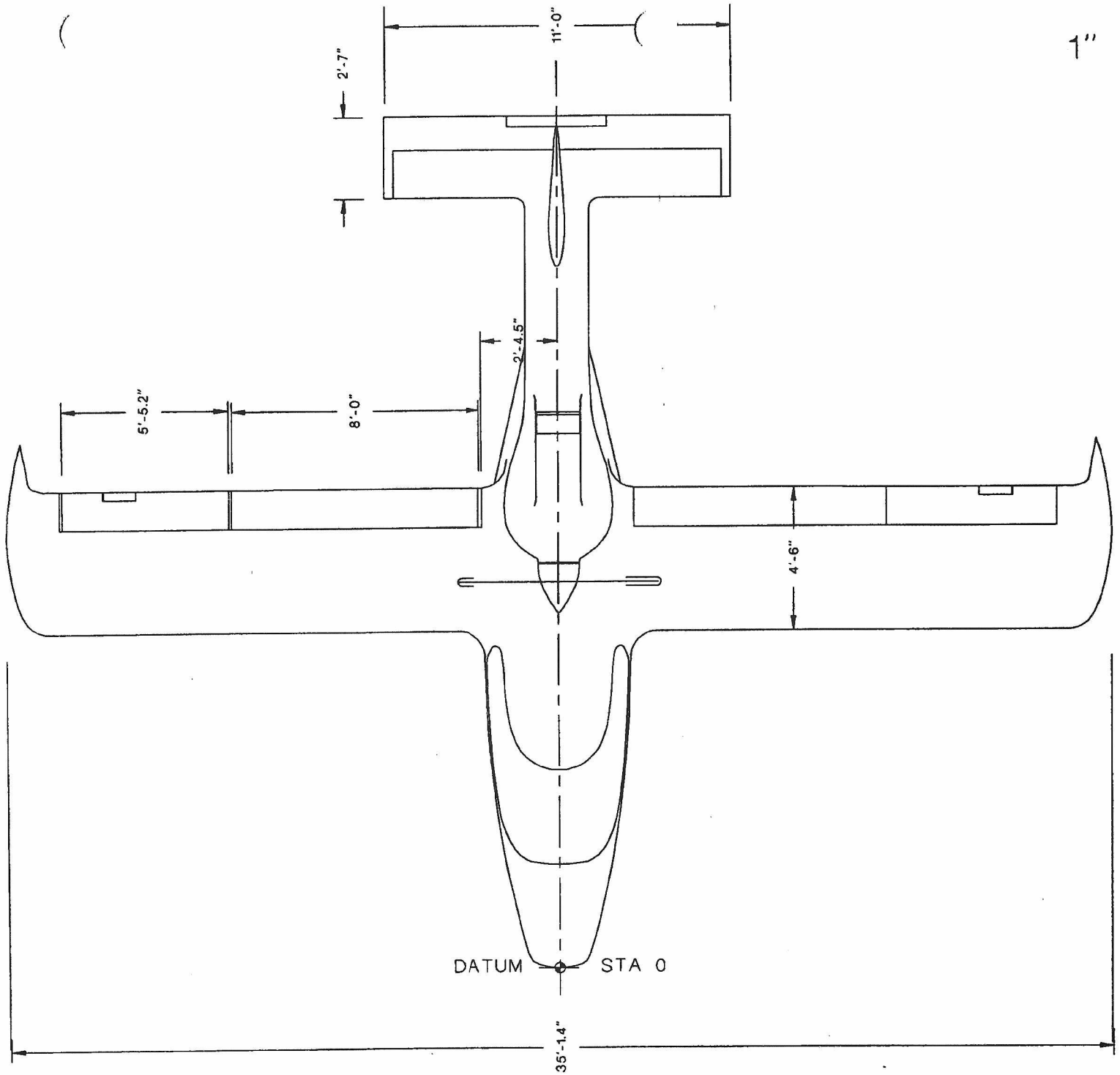
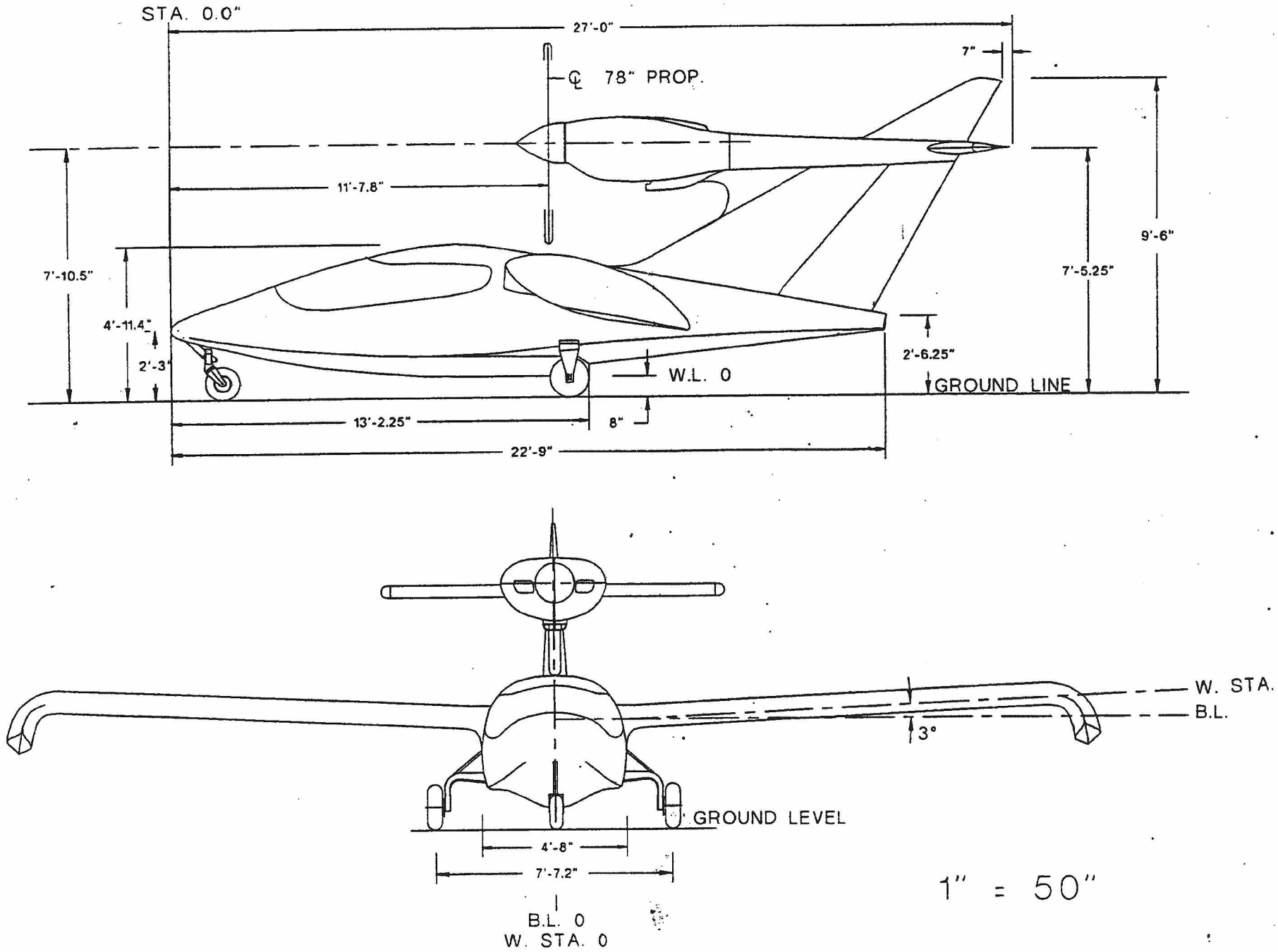
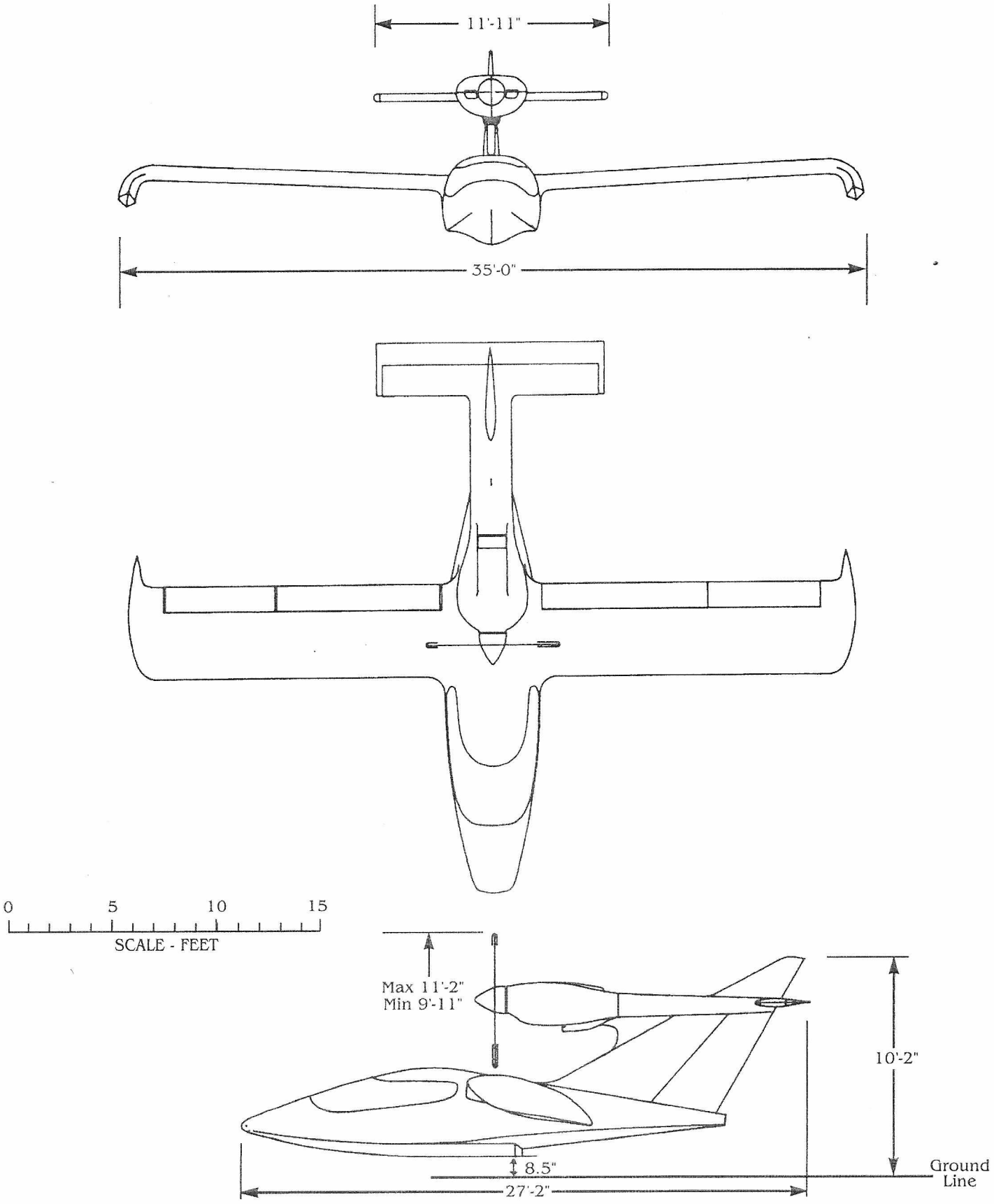
Revised 6/19/2008

1" = 50




STA. 0.0"
27'-0"
7"
℄ 78" PROP.
11'-7.8"
7'-10.5"
4'-11.4"
2'-3"
9'-6"
7'-5.25"
2'-6.25"
W.L. 0
GROUND LINE
13'-2.25"
8"
22'-9"
W. STA.
B.L.
3°
GROUND LEVEL
4'-8"
7'-7.2"
B.L. 0
W. STA. 0
1" = 50"

SEAWIND 3-VIEW



FLIGHT CHARACTERISTICS

LAND TAKEOFF: The Seawind accelerates quickly down the runway. At 70 MPH, a one hand rotation is applied and the craft lifts off between 70 and 80 MPH.

CLIMB: With the landing gear retracted and the flaps set to zero, the Seawind will climb dramatically to altitude.

CRUISE: The cruise configuration is with flaps reflexed to -10°. Once trimmed straight and level, the Seawind is a true hands off machine.

LAND LANDINGS: Landings on land are normal with a gear down speed of 140 MPH maximum, and a flap down speed of 120 MPH. The pattern speed is 90 to 100 MPH as you apply a little up trim to what feels naturally comfortable. Full flaps are applied and propeller set to high RPM on the final leg, with the speed at 90 MPH. After crossing the threshold at 80 MPH, flare to a touchdown speed of between 65 to 70 MPH.

WATER LANDINGS: Landings on water are virtually the same as land landings except, of course, the landing gear is up. Final approach is at 90 MPH with full flaps, at high RPM. A few feet above the water, the Seawind is leveled and slowed to 80 MPH and the nose is raised to about four degrees. The Seawind lands on the step and the throttle is eased back once the touchdown occurs.

STEP TAXIING: Step taxiing can be performed with full flaps or reflexed flaps. The time onto the step is a couple of seconds quicker with zero flaps. The wings are held level and steering is performed with the air rudder.

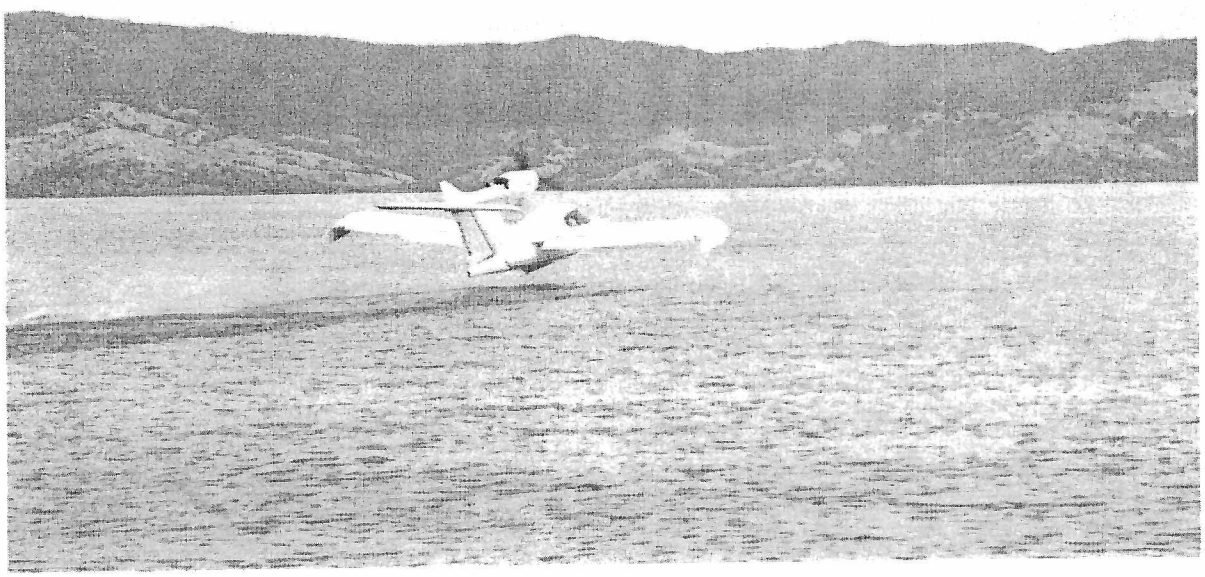
WATER TAKEOFF: Water takeoffs are comfortable. The Seawind rises onto the step virtually by itself. A bit of up elevator is applied as the bow wave moves by. Then, the controls are relaxed and with full flaps at 62 MPH, the Seawind flies itself off the water.

TURNS: Like any amphibian or high thrust line aircraft, turns should be coordinated with rudder and ailerons.

PITCH CONTROL: The Seawind has superb pitch control. A full power go around just above the water is easily executed with one arm pull back. The nose will not drop.

CROSS WIND LANDINGS: Carry a little power in a cross wind landing to make the air rudder more effective. Idling the power tends to block the flow over the air rudder. So, apply just a little power.

STALLS: Stalls are gentle and straight ahead, with a warning buffet.



SPECIFICATIONS FOR SEAWIND AMPHIBIAN

TYPE
4-place amphibian - single engine tractor type - retractable gear.

CONSTRUCTION
All fiberglass, vinylester resin & PVC closed cell foam composite.

DIMENSIONS

Cabin Length		105"
Cabin	Width	Height
Front	52"	43"
Rear	54"	39"
Baggage		
Opening		18" x 40"
Length		74"
Volume		20 cu. ft.
Wing Span		35 ft.
Height		10 ft. 2 in.
Overall Length		27 ft. 2 in.
Ground Clearance		8.5 in.
Water Draft		18 in.
Water Freeboard		13 in.

ESTIMATED	
POWER	260/250 HP
Engine	Lycoming IO-540
Propeller	Hartzell 3 blade 76" Constant Speed
Wing Area	160 sq. ft.
Wing Loading	21.25 lbs./sq. ft.
Power Loading	13.6 lbs./hp
Weight-Max. Takeoff	Land 3400, Water 3300 lbs.
Empty	2230 lbs.
Useful	1170 lbs./1070 lbs.
Fuel Capacity - Mains	74 US gals. (444 lbs.)
Optional - Aux.	36 US gals. (216 lbs.)

PERFORMANCE

Sea Level Speed 100% Power	187 mph
Cruise 75% Power (8000 ft.)	178 mph
Cruise 65% Power (8000 ft.)	167 mph
Economy Cruise 55% Power (8000 ft.)	157 mph
Fuel Burn at 55% Power	10.8 gph
Maximum Range (no reserve)	1075 miles
With Optional Fuel	1600 miles
Rate of Climb	850 fpm
Best Rate of Climb Speed 0° Flap	95 mph
Best Angle of Climb 20° Flap	77 mph
Stall Speed	
Clean	72 mph
Flaps & Wheels	59 mph
Takeoff Distance	50 ft. obst.
Land	1010 ft. / 1550 ft.
Water	1600 ft. / 1980 ft.
Landing Distance	
Land	770 ft. / 1300 ft.
Water	620 ft. / 1150 ft.
Service Ceiling	14,800 ft.
Glide Ratio	10.9:1

ACTUAL	
POWER	300 HP
Engine	Lycoming IO-540
Propeller	Hartzell 3 blade 76" Constant Speed
Wing Area	160 sq. ft.
Wing Loading	21.25 lbs./sq. ft.
Power Loading	11.33 lbs./hp
Weight-Max. Takeoff	Land 3400, Water 3400 lbs.
Empty	2300 lbs.
Useful	1100 lbs.
Fuel Capacity - Mains	74 US gals. (444 lbs.)
Optional - Aux.	36 US gals. (216 lbs.)

PERFORMANCE

Sea Level Speed 100% Power	200 mph
Cruise 75% Power (8000 ft.)	191 mph
Cruise 65% Power (8000 ft.)	180 mph
Economy Cruise 55% Power (8000 ft.)	169 mph
Fuel Burn at 55% Power	12.8 gph
Maximum Range (no reserve)	980 miles
With optional fuel	1460 miles
Rate of Climb	1250 fpm
Best Rate of Climb Speed 0° Flap	99 mph
Best Angle of Climb 20° Flap	74 mph
Stall Speed	
Clean	72 mph
Flaps & Wheels	59 mph
Takeoff Distance	50 ft. obst.
Land	870 ft. / 1175 ft.
Water	1100 ft. / 1450 ft.
Landing Distance	
Land	770 ft. / 1300 ft.
Water	620 ft. / 1150 ft.
Service Ceiling	20,700 ft.
Glide Ratio	10.9:1

Performance figures for the 300 HP engine are the result of actual test data. The performance figures for the 250 HP engine are projected from test data of the 300 HP aircraft. All performance figures are for a sea level standard day and maximum takeoff gross weight of 3200 lbs., unless otherwise stated. Specifications are subject to change without notice.

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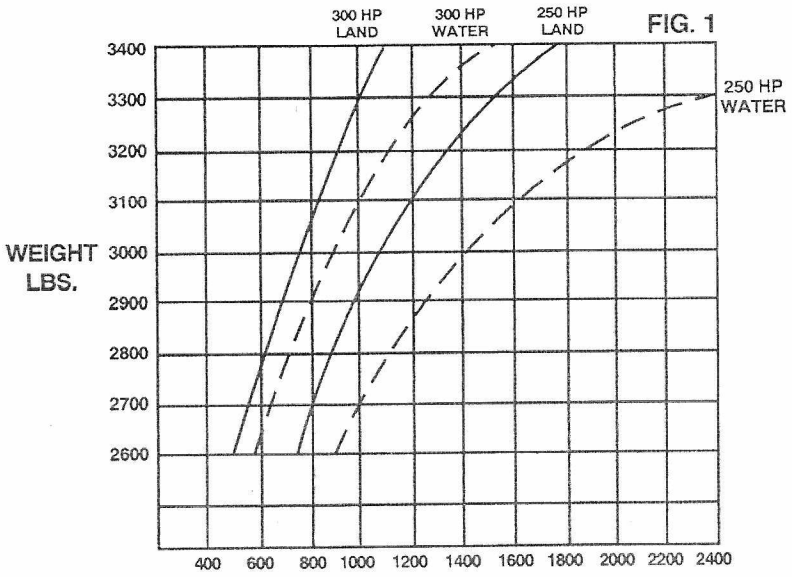
Figures 1 and 2 below show the takeoff and climb performance comparisons for the recommended 300 & 250 HP engines. All the data is for a standard day.

The 300 HP performance data was plotted from actual test data. Tests were performed at 3200 lbs. and 3400 lbs. gross.

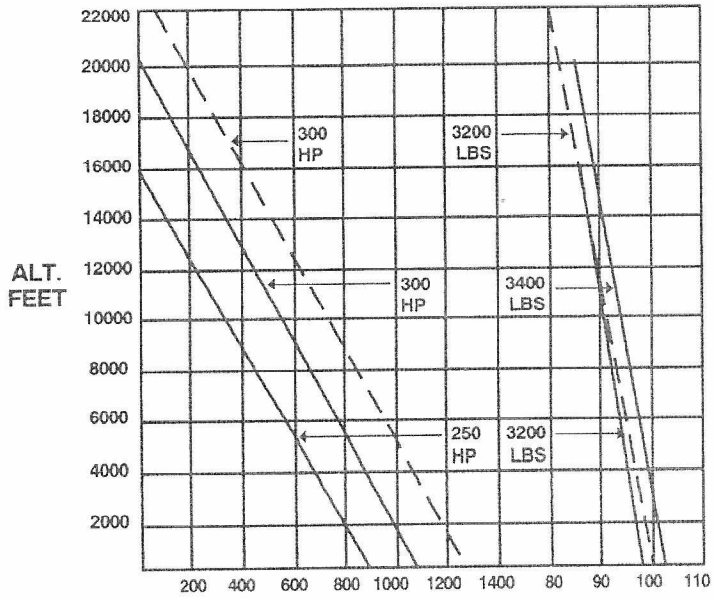
The 250 HP performance data is estimated and projected from data recorded from the 300 HP aircraft flight testing.

FIG. 1



Standard day sea level flaps - 20° land, 30° water
300 HP actual 250 HP estimated

FIG. 2



Climb performance 0 degree flap
Standard day Service ceiling projected

We are continuing to investigate the suitability of other engines for the Seawind. Of particular interest are the two stroke supercharged diesel engines being developed for general aviation. Some of our earlier builders will be installing other than the Lycoming powerplants. We will be supporting and evaluating the results.

The unique tail-mounted engine location greatly reduces cabin noise and positions the propeller well away from careless people. The exhaust discharges well behind the propeller, making the Seawind one of the quietest general aviation aircraft available. Most amphibians are pusher types and the exhaust discharges through the propeller which chops and makes the exhaust noisier.

An optional semi-tuned exhaust system will give up to a 10% boost in power.

The tail and engine mount structure has undergone finite-element analysis and testing of both the tail and mount. In the areas of the tail, we actually used a standard twice the FAR requirements to ensure there would be absolutely no doubt of its integrity. It was designed to a loading of 15 g's vertical, which is five times the requirement for normal category aircraft. The tail is designed for 20 g's forward instead of the 9 g's recommended by the FAA.

N-71RJ

The markings and placards installed on this aircraft contain operating limitation which must be complied with when operating this aircraft in the NORMAL category.

NO ACROBATICS OR SPINS ALLOWED

Not certified for operations in known icing conditions

Lb Weight limits	Departure	Landing.
Hard surface	4000	3950
Water	3500	3400

Fuel heater on at flights below 5 degrees C

Check oil level within 5 minutes of shutdown

VNE: Never Exceed 173 KIAS

V-SPEEDS FOR FLAPS, GEAR, DEPARTING, LANDING, ECT. AT 3200 LBS GW
SEE POH FOR OTHER GROSS WEIGHT PERFORMANCE ENVELOPES

ARCS IN KIAS:	GREEN	YELLOW	RED
FLAPS 0	66-148	149-172	173
FLAPS 20:	55-105		
FLAPS 40 WHITE	41-105		
VLE	122		
VA	87-113		
VX/VY	64/86		
VGL (BEST GLIDE)	87		
CROSSWIND	17		
ROUGH AIR	113		

USABLE FUEL SYSTEM: JET A ONLY.
TWO TIP TANKS 17 GAL EACH
TWO MAIN TANKS 37 GAL EACH
ONE REMOVABLE CENTER TANK 34 GAL

SAFETY & WATER OPERATIONS: EQUIPMENT IN COLOR CODED BAGS.
ORANGE: EMERGENCY ONLY.
BLUE: WATER RELATED EQUIPMENT
ANCHOR, INFLATABLE BOAT, PADDLE, SIGNAL DEVICES AND TIE DOWN EQUIPMENT MARKED AND FOUND IN CARGO COMPARTMENT AFT OF REAR SEAT

FIRE EXTINGUISHER LOCATED IN PASSENGER AREA ON FLOOR JUST AFT OF FUEL SELECTOR VALVE

TURN ON ENGINE FIRE SUPPRESSION BEFORE ENGINE START

TO START ENGINE WITH AUXILLARY POWER SEE POH

N71RJ Profile

- Crew: 1-2 pilots
- Capacity: 4 adult passengers or 2 adult passenger and 3 children
- Length: 27 ft 2 in (8.28 m)
- Wingspan: 35 ft 0 in (10.67 m)
- Height: 10 ft 2 in (3.10 m)
- Wing area: 163 ft² (15.14 m²)
- Airfoil: NLF(1)-0215(F)
- Empty weight: 2,769 lb (1,256 kg)
- Useful load: 1,181 lb (536 kg)
- Max. takeoff weight: 3,950 lb (1,792 kg)
- Powerplant: 1 × Pratt & Whitney PT6A-20 engine, 550 hp (411 kW)
- Propellers: 1, MT 5-blade Constant Speed propeller
- Propeller diameter: 74 in (1.88 m)

Performance

- Maximum speed: 174 knots (200 mph, 322 km/h) at sea level
- Cruise speed: 147 knots (169 mph, 272 km/h) at 55% power at 8,000 ft (2438 m)
- Stall speed: 63 knots (72 mph, 116 km/h) in clean configuration
- Range: 1,029 nm (1,184 mi, 1,906 km) with main, AUX, and center tanks
- Service ceiling: 24,000 ft (7,315 m)
- Rate of climb: 2,500 ft/min (762 m/minute)
- Wing loading: 20.8 lb/ft² (102 kg/m²)
- Power/mass: .091 hp/lb (150 W/kg)

OPERATING LIMITATIONS SEAWIND N71RJ

NUMBER OF SEATS:	4
ENGINE	PT6A-20 550 HP De-rated
PROPELLER	MTV Constant Speed 5 Blade E-610
AVIONICS	G900 FULL SUITE with MFD AND PFD
GRAND RAPIDS	MFD, PFD, WX Full NAV AP redundancy

for G900 including all engine monitoring on a third screen (Grand Rapids EFIS)

TIRES:	**Main Landing Gear – 15/600-6 6.**
Max load	**1950lbs, Unloaded Inflation 52 psi**

Hi altitude capability	Portable 2-place headsets and masks

and one Oxygen tank

Height	10′ 2″
Length	27′ 2″
Wing span	35 feet
Cabin length	105 inches
Width, front	52 inches
Width, rear	54 "
Baggage area	10 cubic feet
Propeller	MT Composite 5 blade 74′ constant

speed

Max Gross Wt	4000 take off
Empty Wt	~~2769~~ LBS 2640
Fuel	Total: Jet A, 145 gallons (968 Lbs).

Normal: Two 37 gallon Main wing tanks and two 18 gallon Aux tanks = 110. Also a 35 gallon removable center tank for long range excursions

Sea-level endurance: With center tank; 6 hours at 140 knots IAS cruise with IFR reserve estimated at 840 NM. (Actual range varies with altitude/TAS).

Service Ceiling	FL 240
Rate of climb (SL STD)	2,500 FPM, 3600 Lbs gross weight
Rate of climb FL200	1,505 FPM
Time to climb " "	20,000 in ten minutes with constant 300

shaft horsepower.

TAS with IAS of 140
FL 200 STD 189 Knots 300 HP
TAS at 8,000 159 Knots 300 HP
Theoretical Max Speed 261 Knots 270 HP 30,000' (calculated) standard atmosphere and 1,000 FPM normal climb rate, 3200 Lbs Gross Wt

	Vapr	Approach With Flaps Only
	Vmc	Minimum Controllable
64	Vxse	Best Angle
86	Vyse	Best Rate. All in knots IAS

Tested knots V Description

66	Vsi	Stall Clean
55	Vso	Stall Dirty 20*
41	Vso	Stall Dirty 40*
64	Vx	Best Angle Climb, 20° Flaps
86	Vy	Best Rate Climb 1050 FPM 20° Flaps
87-113		Va Maneuvering
140	Vno	Normal Operating
173	Vne	Never Exceed
122	Vle	Landing gear
105	Vfe	Flap Extended
87	Vgl	Best Glide, ~~91 Knots~~. **10/1Glide Ratio Clean**
17		Crosswind Component
113		Rough Air

Take Off Distance	**Land**	**– Water**
3,200 Lbs	870 Ft.	1,100 Ft.
3,400 Lbs	1,175 Ft.	1,400 Ft.
Over 50' Obstacle	1,400 Ft.*	1,600 Ft.*

Maximum Gross Weights

	Hard Surface	Water
Take off	3950	3600
Landing	3800	3600

1

* Estimated