U.S. Department of Transportation
Federal Aviation Administration

Memorandum

Subject: **ACTION**: Equivalent Level of Safety, S.N.A. Inc. Seawind SW300 Gross Weight Over 2700 Pounds; Finding No. ACE-95-3

Date:

From: Manager, Standards Office, ACE-110

Reply to Attn. of:

To: Manager, Small Airplane Directorate, ACE-100

This memorandum is to document concurrence with an equivalent level of safety to the FAR § 21.24 (a)(1)(ii), maximum weight for Primary Category airplanes.

BACKGROUND:
The Seawind is a four place, 300 HP, composite amphibian airplane. S.N.A. Inc. has proposed certification of their airplane with a maximum takeoff weight of 3400 pounds in the Primary Category. The applicant contends that the writers of the requirements for Primary Category did not consider amphibians in establishing the weight limit for this class airplane. FAR § 21.24 (a)(1)(ii) limits the weight to 2700 pounds.

APPLICABLE REGULATIONS:
Part 21 covers the requirements for the certification of products and parts. Under § 21.24, issuance of type certificate; Primary Category Aircraft:

(a) The applicant is entitled to a type certificate for an aircraft in the primary category if -

(1) The aircraft -
(ii) Weighs not more than 2700 pounds

DISCUSSION:
S.N.A. Inc. believes that added versatility afforded by the amphibian in its capability to land on water or land and in an emergency with gear up on snow and ice, plowed or planted fields, and rough terrain with the increased chance of occupants being able to walk away justifies consideration of their request. They also point out in the way of precedence, that the Ultralight Vehicles exclude float weight from their empty F.A.R. 103 requirements.

S.N.A.,INC POSITION:

Land Planes

The limitation of 2700 pounds is an adequate and reasonable limitation for land planes. A number of land planes such as the Lancair ES, Express, White Lightening and the Velocity are kit planes, which fall reasonably within the limitation of 2700 pounds and could be candidates for the primary category. They are all land planes with gross weight near 2700 pounds and have four cylinder 200 HP. engines. They all have 900 to 1300 NM ranges.

Amphibians

There is not one four-place amphibian aircraft currently produced, either certified or in kit form, which is 2700 pounds or less.

Amphibians require more horsepower to take off from water and require more horse power in flight due to increase drag from a hull/step configuration and sponsons (wing floats). The six cylinder engines and larger three-blade propellers increase the weight by 195 pounds on the average.

Amphibians require that the engine and propeller be mounted above the hull, thus increasing the structural weight up to 145 pounds for the pylon or tail structure necessary to support the engine.

The wing sponsons and the wing structure must be designed to withstand the water loads and impact loads, thus increasing the wing system structural weight about 90 pounds.

The hull must be capable of withstanding point impact loads at a variety of locations as well as take off and landing loads over the entire hull bottom. The weight of the structure is increased by approximately 110 pounds for the skin strength and stronger bulkheads and longerons.

Amphibians require retractable landing gear for landing on water, thus adding more than 30 pounds to the weight.

Amphibians, because of the high thrust line, require larger elevators and stabilizers to overcome the vertical pitching forces, as well as a larger rudder for yaw stability. The resulting increase in weight is approximately 30 pounds.

Amphibians also require a water rudder mechanism for slow taxi maneuvering in the water, again increasing the weight approximately 20 pounds.

The outlined increases in structural weight total approximately 620 pounds more in empty weight without any increase in useful load. Even conventional aircraft which are outfitted with floats, will have an empty weight increase of approximately 450 pounds for the floats and structural reinforcement.

For the equivalent useful load and the same range, amphibians will be required to carry 23% more fuel or about 15 gallons, equaling 90 additional pounds.

Therefore an amphibian must carry generally 710 pounds more in gross weight to be equivalent to a four place land plane of the same useful capacity and range.

The following data is presented as further justification for this petition.

4-Place Amphibious Aircraft

Specification	Seawind	Lake Renegade	Republic Seabee	Spencer Autocar	Air Shark
Pilot & Passengers	4	4	4	4	4
Certified	Proposed	yes	yes	no	no
Kit Plane	yes	no	no	yes	yes
Current Production	yes	yes		yes	yes
6-Cylinder Engine	yes	yes	yes	yes	yes
Gross Weight	3400	3140	3150	3200	3200
Empty Weight	2300	2280	2190	2160	2020
Useful Load	1100	860	966	1040	1180
4 Passengers & 60 lb. Luggage	760	760	760	760	760
Fuel available at gross (gal.)	57	17	34	47	70
Range (nm) w/ 4 passengers & 30 min. reserve	580	153	184	295	740

Table 1.

The two certified aircraft, Lake Renegade and the Seabee, have severely limited ranges because of the lack of useful weight. An increase to a 3400 pound gross would provide both with a reasonable, but limited range.

The Spencer Autocar and the Airshark can both be accommodated with a reasonable range with a 3400 pound gross weight limitation.

The Seawind program could also be accommodated with a 3400 pound gross weight limitation.

To severely restrict gross weight invites over gross violations to make the aircraft useful. A gross weight of 3400 pounds is reasonable.

Training
There is a need for affordable seaplane training aircraft for instructional purposes.

Summary
The intent of the "Primary Category" program was to make available four passenger personal use aircraft to the general public.

By definition, a four place aircraft must be able to carry 680 pounds of people, and to be practical , it must carry a reasonable quantity of luggage and fuel for a reasonable range. A useful load of 1100 pounds provides this capability.

To provide for less useful load, is impractical and invites overload of the aircraft. Therefore a practical equivalent weight limitation for an amphibian is 3400 pounds for take off gross weight.

FAA'S POSITION:

The FAA targeted what was considered a suitable performance/payload/range package for sport aviation when it created the Primary Category. The limitations were developed around many existing land based airplanes. The 2700 pound gross weight limit offered the user reasonable utility. The airframe weight and drag penalty inherent with amphibian flying boat designs, if restrained by the same limits, would provide a significantly inferior performance/payload/range benefit to the user than originally intended for the Primary Category. The summary of amphibian data in Table 1 supports this. Consequently, based on past experience and information presented by the applicant, a 3400 pound limitation for amphibian airplanes is considered by the FAA to offer the same level of safety and utility as the original Primary Category weight limit for land based airplanes.

The applicant, S.N.A. Inc. is essentially requesting that amphibian airplanes be included in the original intent of the Primary Category. The FAA never intended to exclude amphibian airplanes and agrees with the applicant to allow a weight increase to 3400 pounds for amphibian airplanes.

CONCURRED BY:

J. Bunna 3/9/95

Manager, New York Aircraft Certification Office — Date
ANE-170

[signature] 3/3/95

for Manager, Standards Office, ACE-110 — Date

Henry A Armstrong 3-3-95

acty Manager, Small Airplane Directorate — Date
Aircraft Certification Service, ACE-100