Seaplane Comeback

Flying boats already have the range. Now they're getting speed.

By MALCOLM CAGLE

Lieutenant Commander, U. S. Navy

BEHIND that smokescreen of atomic dust, biochemical fog and jet exhaust is a browraiser that will surprise many an aviator. Rising from the canvas, bloody but unbeaten, the seaplane is about to pull a turtle in the rabbit race.

Seaplanes, both commercial and military, have been orphans in the aviation family for years; in fact, ever since Pan Am gave them a pink slip back in 1940. In the U.S. Navy, the old faithful PBY *Catalina* has been standard equipment since 1936. Such a fact may make Consolidated's stock jump another point on the Exchange, but it is also eloquent testimony that the seaplane has been anchored for more than a decade. Phenomenal technical advances made by the heavy bombers and fighters during the war were not duplicated by the seaplane. While speed needles on large land planes were pushing close to the 400 mark, seaplanes were chugging along at 120-150, strictly 1918 stuff. Many an anti-sub mission out of New England fields during the last war was cancelled when winter winds got up to 50 m.p.h. or more. On a long patrol, the seaplane simply couldn't make it out and back.

When aviation was still in swaddling clothes, seaplanes were holding their own in the competition with land planes. One of Langley's early machines was a seaplane. Glenn Curtiss, of course, pioneered the seaplane and did much of aviation's earliest research in it. It was a seaplane which first flew the Atlantic Ocean. But about the time of the Ford Tri-Motor, and the mushrooming of modern hard-surface airfields all over the United States, the seaplane seemed destined for the commercial junk heap. Before American aviation could start to fly oceans on a money making venture, it was first necessary to fly cross country.

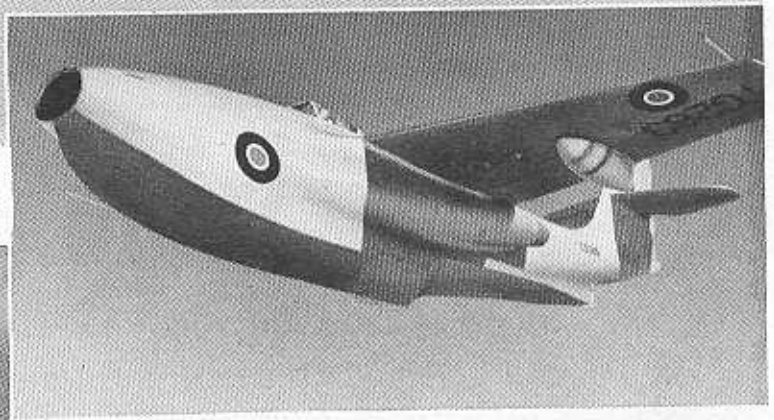
Today, however, the outlook is substantially different. Progress, know-how and science have given the seaplane a belated hypodermic. New engines, new metals and new hulls have added a blast of water injection, and new problems have arisen which have brought this reluctant dragon to center stage into full spotlight. One of the Navy's aeronautical engineers goes so far as to predict that in the not-so-distant future, seaplanes will be giving land planes a run for the passengers' dollars.

It has been common knowledge for some time that the "state of the aeronautical art" is at a temporary impasse. As planes get bigger and heavier, they unfortunately don't fly faster or go farther. For example, increasing the weight of a plane from 200,000 pounds to 300,000 pounds only increases the range around a pitiful 300 miles. The law of diminishing returns, in other words. Nobody is so pessimistic as to consider this situation permanent; but a great many of our aviation experts *do* think it will take "several" years for the picture to improve. They point

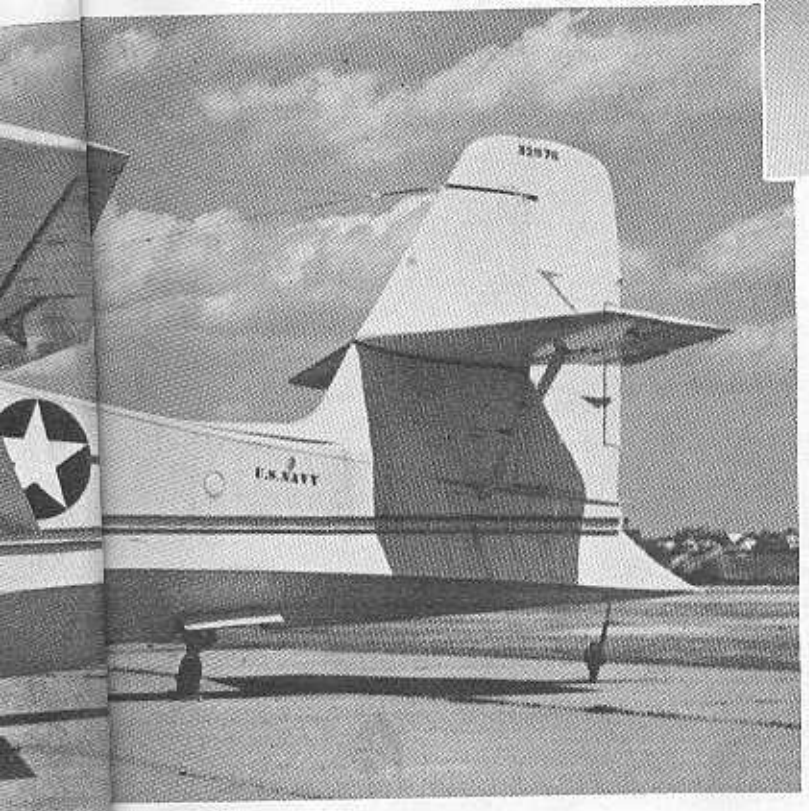
Scaled-down hulls are bolted to Edo-modified Widgeon, used by Navy and NACA to test new designs. Hull (below) is that of Martin XP5M-1.

New "afterbody" hull on Martin XP5M-1 will give better performance than old-style hulls, designers say.

Convair XP5Y-1 will have four turbo-prop engines. The largest seaplane ever built by Convair, it is designed as a Naval patrol boat.



World's fastest flying boat is British Saunders Roe A-1, 550-m.p.h. single-seat fighter. It has two axial-flow turbo-jets.



out that some phases of aviation are years ahead of other phases. Aviation metallurgy is dragging its feet despite tremendous efforts to keep it abreast of 1,000 m.p.h. planes and the extreme temperatures inside jet engines. Aviation gasoline still weighs six pounds per gallon. And much necessary information remains unknown despite prodigious research. What, exactly, will supersonic flight be like? How high can we fly and still fight?

In this ragged state of progress we see the reason for such an enigma as the land based bomber which has the speed but lacks the range, while the seaplane has the range but lacks the speed. The goal, of course, is the true intercontinental plane which has *both* range and speed. It is at this point that the seaplane invades the scene.

For at long last, the water-borne airplane is learning to fly fast. Already the Navy is making daily tests of several new hulls whose aerodynamic silhouettes compare favorably with the familiar (*Continued on page* 71)

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cigar shape of the land plane hull. These tests employ a specially built and rigged Grumman *Widgeon* to which a variety of hulls can be bolted. The experimental hulls can be built, tested, interchanged, modified, and perfected with a minimum of time and expense. Preliminary tests indicate that their drag will not greatly exceed that of the land plane hull. Secondly, the seaplane is the perfect platform for the turbo-prop power plant. This hybrid engine, driving an improved propeller, produces superior power at very low weight. And what is most important, fuel consumption is excellent, even at low altitudes. The seaplane can save and convert the weight of wheels, landing gear structure, and a complicated hydraulic system (somewhere between 5 per cent and 10 per cent of the gross weight) into speed and range. Finally, the seaplane can operate from any of the 70 per cent of the earth's surface which is water, with no need for 18-inch concrete, 8,000-foot, obstruction-free runways.

As a clincher, take a look at the world map or globe. Fighting an intercontinental war requires that land planes have ranges of between 3,500 and 4,500 miles. Chicago to Berlin is 4,458 miles. New York to Moscow is 4,431 miles; Bombay to Warsaw is 3,579 miles. Building bigger bombers is not the answer at present. We've already mentioned that increasing the weight by 100,000 pounds only increases the range an approximate 300 miles, while serving to reduce top speed. The only other things that increase are the length of the runways, the thickness of concrete and the staggering expense of a base necessary to support such a Goliath.

All this talk about seaplanes isn't just dream material either. The planes are on the way. The first comer was the P5M which featured the long after-body hull. The X model of the P5M was described by the Navy as capable of "200 m.p.h. or more." Consolidated Vultee's P5Y should have even better performance. This elongated water bird will have four turboprop engines which will produce more horsepower at take-off per pound of airplane than most modern fighter aircraft. It also features an advanced design hull whose high length-beam ratio will give excellent water characteristics and reduced air drag. Translate these features—peak power and low drag—into performance and you have reached the goal, a *fast* seaplane.

Perhaps the most startling and unique innovation in the realm of seaplanes has been the British development of a *fighter*-seaplane, the Saunders-Roe SARO-1. This single-seater flying boat is unusual both in design and planned employment. It is the first *fighter type* flying boat, and it is the first seaplane to utilize the gas turbine. If the released performance figures of the first flights in July of 1948 are studied, it is apparent that the plane can hold its own in any pursuit plane's sky. The British will say no more than it is in the 500 m.p.h. class, that its rate of climb is better than 4,000 feet per minute, that it gets off the water in 11 seconds, and that its wing loading is under 40 lbs/ft. With drop tanks, the SARO-1 has a two hour range. Its wing tip floats are retractable, fairing into the wing by rotating through 180°. The plane has a 46-foot span, a 50-foot length and an ejection seat similar to the one used in our American jets. This one-seater jet seaplane is novel but practical evidence that the modern flying boat is not confined to a single purpose or mission.

From another angle, the seaplane looks to be the long sought aspirin for the submarine headache. To use the words of Secretary of the Navy Sullivan when he spoke before the House Appropriations Committee: "When World War II started, Hitler had fewer than 50 submarines and he very nearly won the Battle of the Atlantic. There is a nation which has, to our certain knowledge, more than 250 submarines today. I cite these figures merely to indicate to you the degree of our interest in the development of new submarines and new antisubmarine tactics." World War II proved that the airplane is the defense against the submarine, even one which can make 20 or more knots sub-surface. Our newer seaplanes will have the range, the endurance and the weight-carrying capacity to track down, hold down, and destroy the U-boat.

It is a reasonable conclusion that any advancements made by the military seaplane will be reflected in commercial fields. Indeed, with soaring production costs and the phenomenal financial outlays for design research, progress in commercial air must follow military air progress. Two world wars rushed air travel and transport out of its diapers and pushed it to full maturity. If the seaplane evolves into a fast, high flying, long reaching heavyweight, as all evidence seems to predict, it is inevitable that oceanic and intercontinental aviation commerce will become interested. A fundamental reason will be economy. Simplified design, simplified structure, elimination of landing gear and associated parts, fewer design restrictions (such as the ability to clear a 50-foot obstruction from a 5,000-foot runway) are all on the credit ledger. The airfield problem will diminish for these planes will operate in both shallow water and in all but the heaviest seas. Safety will increase. Forced landings at sea, take-off and landing accidents, will not take the toll of lives that comparable crashes on land exact.

Into the nascent seaplane versus landplane competition, another intangible is rearing its head. And that is the diminishing desire of the American public to fly faster. For the businessman and the merchant, speedier air transport will always be a prerequisite. But for the vacationist, the tourist, the traveller, saving an extra hour or half a day is not a necessity when comfort and ease can be substituted. The seaplane would appear to be the cheapest way of providing the air passenger with all the plush luxuries (bars, bunks, entertainment) of seagoing ocean liners.

Maintenance on seaplanes, with their weights going upwards toward the 400,000

mark, has posed new problems. Like ships, these huge seaplanes will have to be drydocked. An experimental dock—portable and collapsible—was recently tested successfully at Port Hueneme, Calif. The dock was 103 feet long and was divided into eight sections which could be loaded aboard any small vessel. Hoisted off, piece by piece, the sections were then coupled together. Water was taken into the pontoon tanks to partially sink the dock, and the plane was then floated in; whereupon the dock was pumped free of the ballast water and the seaplane lifted into the air. This method obviated the time-consuming and tedious task of hoisting the planes onto a tender for overhaul and repair. The commercial uses of such a dock are obvious.

The seaplane has one other trait which makes its return engagement on the military scene even more promising—versatility. The seaplane has more uses than an alley cat has fleas. The number of its utilitarian roles is exceeded only by the helicopter. The seaplane is a natural for rescue duty and aerial weather reconnaissance; it is an ideal photographic platform; as a transport, both personnel and material, it is unsurpassed. For reconnaissance, for communication and radar relay, for convoy coverage, for coastal and harbor protection, the seaplane cannot be equalled by aircraft of any other type.

If one listens to those interested in the seaplane's future, he hears some ideas which, if not downright startling, are at least Buck Rogerish. Some of the designers are calling the futuramic seaplane the "flying freight train" and predict it will supplant the ocean-going transport. Others are saying that any future amphibious assaults will be sparked by troops landed suddenly and silently from mammoth seaplanes. And still others are designing parasite fighters (similar to the XF-85 hook-on arrangement to the mother B-36) to protect the nest and the cargo once it has been put ashore in enemy territory.

Seaplanes and the art of building, flying and using them, have long been an American monopoly. In these days of the Cold War and repeated international crises, the seaplane is coming back to be our ace in the hole. END

Air Line Skies

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back their help. The water carriers have never earned back theirs.

So what was all the uproar about in 1947, when the then Chairman of the CAB (who was afterward retired) was making speeches about airline bad management and over-expansion, and Congress and the newspapers and the public were drinking it in?

Today one wonders, and history will always wonder. The cost of doing business increased nearly ⅔ pre-war to post-war, which economists concede more than offset the unit savings to be expected from increased volume. Consequently one would have supposed the airlines in the three years since the war would have been entitled to at least the same mail rate they were paid in 1941. *Had they been paid that mail rate they would have had a profit of $61,000,000 for those three years instead of a loss of $37,000,000. What is more important, had they been paid a rate proportionate to the vast increase in service performed in other categories beside the carriage of mail they would have had a profit of $185,000,000.*

Take a simple comparison. Suppose you are in the habit of buying one quart of milk each morning for 22 cents. Now suppose you decide you want five quarts and, although the rest of your cost of living has gone up 62 per cent, your dairy charges you only 57 cents for the five. Would you feel you were being cheated? I judge not. You are getting five times the milk for only 2½ times the total cost, in spite of the rise in the price level. Yet this would be precisely the situation between the airlines and the taxpayer *if the airlines were now paid a mail rate sufficient to return them 10 per cent on their investment for every year since the war!*

Does this sound as if mail pay might have something to do with the airline problem, or do we have to search elsewhere? The question is rhetorical, but one becomes more and more startled as one considers the sort of thinking that has marked criticism of the airlines until recently. Instead of accepting the obvious, responsible public officials have preferred to lay the blame on almost everything else, but especially on over-expansion and low load factors. These in turn, of course, have been attributed to bad management.

Let us again look at the facts. Since 1941 the number of route miles in the airline network have been multiplied by less than three. At the same time, the number of passenger miles have been multiplied by nearly five. In other words, the density of the system has been almost double. How can anyone in his right mind regard this as "over-expansion" or consider it as contributing in any degree to air line losses? Because certain isolated segments may be saturated is no reason for confusing them with the main problem. A man with a severed artery may incidentally have a headache but you don't treat the headache, you mend the artery.

Or take the related matter of load factors (the percentage of available seats actually occupied). The average Pullman load factor for the six years preceding the war was 41 per cent. For the year 1947 it was 54 per cent, and no year, other than the war years, has equalled 1947 on the rails. There are no figures for coach travel but it is certain they would be lower than Pullman. Bus figures tell the same story. Load factors above the fifties simply are not a part of the economics of transportation in peace time. Public convenience would suffer if they were.

Now look at the airline situation: load factor for last peacetime year (1941), 59 per cent; for 1947, 66 per cent; for 1948, 59 per cent estimated. Where is the over-expansion there? Momentary episodes of over-buying and over-staffing, yes. But as to these episodes having any real significance in the total financial picture, obviously no. One might as well place on the Washington monument the blame for the tides. The basic cause, the only significant cause, of our depressed air transport industry has been mail rate deprivation and we might as well—all of us—face it.

And why shouldn't we? The airlines have excelled every other form of transportation in the past in the matter of subsidy—have done more for less, have earned back their help faster! They will do so again if proper clearance is received.

The happy part of it is that the CAB, and I think the Congress, show signs of granting it. The only kind of action that can solve the problem is being taken. Mail rates are being increased, rapidly and substantially. Key senators are making encouraging statements. The CAB and the Congress, being human, will wrap up the mail pay in careful reservations, will talk much of reciprocal obligations, will continue to murmur mergers—and no doubt consummate a few. Many people, inside and outside Government, have got to save face—let us not begrudge them the gesture.

Moreover, adversity, however undeserved, has taught the industry much. From the pocketbook standpoint the taxpayer will probably be still better off in the end, and from the development and service standpoint the lost ground of the past three years will be regained in time. Such is the silver lining to the cold front clouds still visible around and behind us, but breaking ahead. END