



The Beaver is a classic example of what can result from a financial faith in the future. Over a thousand have been sold since Russ Bannock (above, in cockpit, talking to P. C. Garratt) took the prototype into the air on its maiden flight.

Financial Faith in the Future

By **GROUP CAPTAIN H. R. FOOTTIT**

"All great and honorable actions are accompanied with great difficulties . . ."

—William Bradford

THE BRITISH had tried it out in the air battles that ebbed and flowed over their islands during the dire days of World War II. But it had proved an easy prey for the German fighters. So in the end they crated up their Brewster F2A "Buffalo" fighters, that they had wrung from American production, and shipped them to Rangoon and Singapore. Here, in these secondary theatres of war, the Buffalo should be able to carve a name for itself. For it was already a standard weapon in these skies with the U.S. Navy and the Royal Air Force

of the Netherland East Indies. And as one journal of the day put it, the Buffalo "has gained an enviable reputation abroad for performance, maneuverability, and fire power."

The British soon found out that the Brewster, like so many of our peacetime products, had been served up with a heavy helping of prewar platitudes. It couldn't stand the ravages of war in any theatre. As the two Japanese authors, Okumiya and Horikoshi, pointed out in their book *Zero*, the Americans had boasted that the Buffalo "was the most powerful fighter plane in the Orient, and a fighter plane far superior to anything in the Japanese Air Force." In true fact, however, "against the Zero fighters, the Buffalo

pilots literally flew suicide missions."

Fade-Out: In the final reckoning the Buffalo slipped from the scene, and at the close of the war the Brewster Aeronautical Corporation locked its factory doors for all time. This case of the Brewster, I think, signalled the end of an era: an age when aviation was classed as a "romantic industry"; an era when the faith of a manufacturer in the future of his products was measured against the amount of colorful publicity that he could foist on the public press.

Today some ghosts of our romantic past still linger with us. But behind the closed doors of most contracting agencies a new day has dawned. Now the purchaser of aircraft, engines, and

equipment, which are still in the development stage, is demanding that the manufacturer show faith in his product by helping finance it through development to production. Gilt edged claims in the company's brochure must now be backed by gilt edged securities from the company's treasury. This new approach to purchasing is bringing forth a new spirit in our contractors. The flame of pioneering enthusiasm is beginning to burn brightly again.

In view of a few inroads by new government missile organizations, many manufacturers in the Western World are beginning to recall that they originally wrested their place in the aircraft business from similar government competition. And they did it by showing a firm financial faith in the future of the air age.

Government Factories: In the 1910 era for example, both the United Kingdom and the United States set up government organizations to design, develop and produce airplanes and aeronautical equipment. Take the case of the U.S. Navy's "Naval Aircraft Factory." In 1917 the U.S. Navy was hurriedly launched into World War I. The Navy was used to thinking in terms of government "Dock Yards" and it almost foundered when it didn't have any such thing for airplanes, nor enough company help to produce the aircraft for the Navy's patrol and anti-submarine roles.

So in the fall of 1917 the first sod was turned in Philadelphia for the new Naval Aircraft Factory. The Navy was careful to make sure that it was not just setting up a naval production fa-

cility. For in the terms of reference for the new Factory they stated that it was to design and develop new airplanes to meet the Navy's demands.

The N.A.F. got underway with a production order for the Curtiss H-16 flying boat and they test-flew their first model from the waters by Philadelphia early in 1918. This was followed up by a further order to produce a British designed flying boat, the F-5. With this background of experience the Factory was ready to plunge into new design work. After the armistice was signed the Navy's designers began turning out blueprints for a number of new aircraft. One of the earliest, and probably the most famous, was the PN series of patrol flying boats. However in the design of these the Navy took the traditional cautious approach and stayed with the successful hull lines of the old F-5 flying boat. So the series was essentially the F-5 hull with new wings, engine installation and tail configuration.

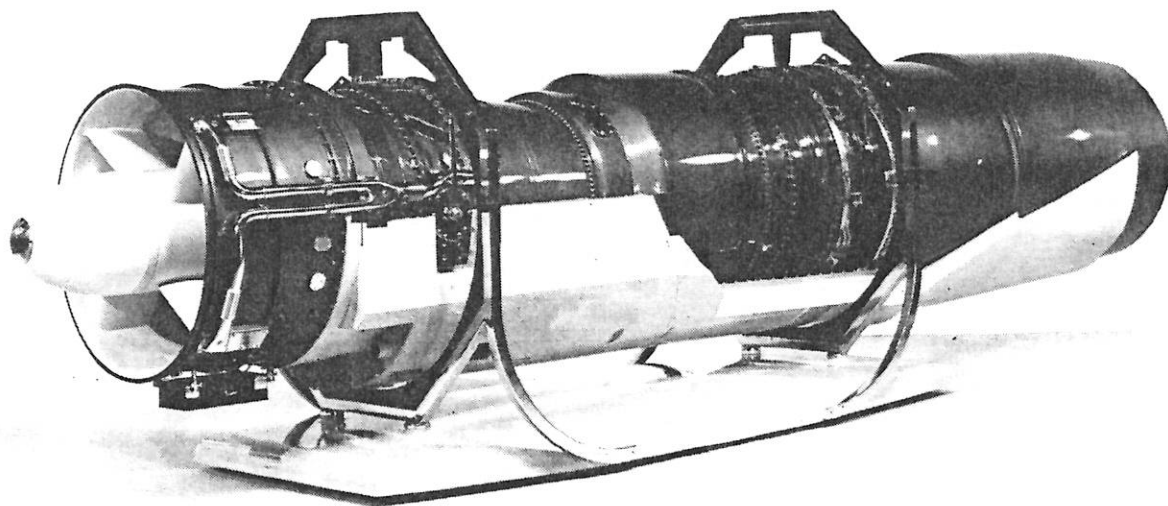
At the Peak: By the time the N.A.F. reached the PN-9 model in their series they were probably at their peak in the competition with the civilian contractors whom the Navy also employed. But the Factory achieved a measure of fame. The PN-9 was still based on the old F-5 hull, but it had been redesigned in metal. Then in a test flight on May 1st, 1925, the PN-9 established an endurance record by staying in the air 28 hours and 35 minutes. Four months later the same twin engined biplane was anchored in San Francisco Bay being readied for a long distance hop to Hawaii. Commander John Rodgers was in charge of the flight. On August

31st he plowed up the quiet waters of the Bay as he lifted the heavily loaded ship into the air and pointed her nose west.

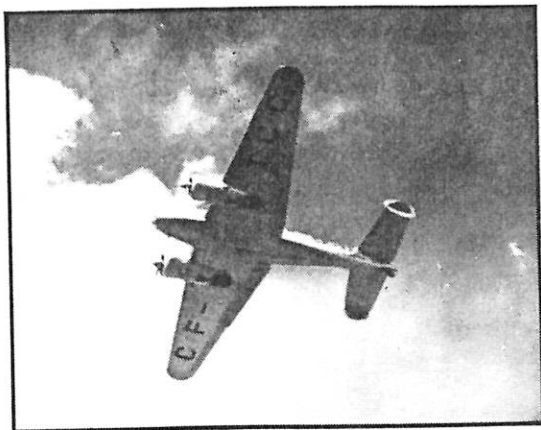
While the world waited, wondered and hoped, Rodgers disappeared. As it turned out the PN-9 and its crew had run out of gas only fifteen miles from the Island of Kauai. But Rodgers had glided down to a safe landing on the wastes of the Pacific. Ten days later, to the relief of the waiting world, Rodgers and his crew were picked up by submarine. The flight had come to a successful end. And Rodgers long distance record for flying boats was to stand, unbeaten, for about five years.

In the meantime the Naval Aircraft Factory was busily churning out new designs of seaplanes, fighters, trainers, and rigid airships. As late as 1935 they were still in production on their latest trainer model. However, the Factory was losing ground in the design field to the Navy's civilian contractors. By the time the guns sounded in World War II the N.A.F. was reduced to a small scale production plant and after the war it stopped this activity and spent its time on such equipment as catapults, ejection seats, and bomb hoists. Grumman, Lockheed, Chance Vought, and the other navy contractors had finally won the race. In April, 1956, the N.A.F. as such was disbanded and it was quietly redesignated the Naval Air Engineering Facility. After 39 years the design of airplanes was dropped from its role of duties.

Autopsy: The early pioneering design spirit of the aeronautical contrac-



Orenda spent several millions of its own funds in initiating the development of the Iroquois as a private venture.



Lockheed developed the Electra with its own funds and laid the foundations for one of the world's largest aircraft builders.

tors, that slowly strangled the stodgy Factory, has best been summed up by the wartime scientist Dr. Vannevar Bush in his book *Modern Arms and Free Men*. Said Dr. Bush, "Those military aeronautical pioneers were essentially rule-of-thumb or handbook engineers, men who came up through the roundhouse, to write in railroad terms . . . They would try anything at least once. Their organization was loose, and, as was bound to be the case in view of their individual characteristics, they avoided the rigidity that often keeps military affairs in a straight jacket. We owe them much."

One of the later U.S. companies that helped set the stage for the design finale of the Naval Aircraft Factory is the Lockheed Aircraft Corporation. Lockheed has certainly "come up through the roundhouse" in 25 years—from a state of bankruptcy to a position as one of the world's leading manufacturers. And the way they got started again is a good example of that pioneering spirit that showed a true financial faith in the future.

The Lockheed organization was launched by two brothers who built their first airplane in 1912, just nine years after the Wright's flight. By the late 1920's Allan and Malcolm Loughead had firmly established themselves as airplane designers. They had started out in a small factory in Hollywood, California, but by the time they were producing the successful Lockheed Vega—that Post and Gatty made famous in their round-the-world flight of the *Winnie Mae*—they were settled in a rambling factory in the present Lockheed location in Burbank. From here came other successful designs: the Sirius, the Altair, and finally the Orion, that did stellar service on the early airlines as a fast single engined transport, which had pioneered the modern style of low wing and retract-

table landing gear. In 1929 the brothers sold out to the Detroit Aircraft Corporation.

Down to the Bottom: In the depression days of the early '30s the Detroit company sank into bankruptcy and hauled Lockheed with it. In 1931 Carl B. Squire was appointed liquidating agent for Lockheed, but instead of dissolving the derelict company he fought to keep it in existence. About this time Robert E. Gross, who had just folded up an unsuccessful venture in the Viking Flying Boat Company, heard about the struggling Lockheed outfit. He knew that their sleek Orion planes were doing the Los Angeles to San Francisco passenger run in record time. He liked the look of the airplane. Gross went to see Squire and he liked the look of the company. As a result he talked five associates, all under 40 years of age, into helping him buy the organization for \$40,000. This they did and Gross took over as Treasurer.

All Gross and his confreres had really bought was a rundown office with factory, a ragged field that was used as an airport, and four partially finished airplanes. As he was pondering over this one day in 1932 he saw one of their Lockheed Orions on the field beside one of the early Boeing 247 transports, a twin engined, low wing, all-metal airplane. Gross looked at both planes from a passenger's viewpoint. Which would he rather ride in? The answer was obvious: the Boeing. So with true pioneering spirit he decided that one way or another Lockheed must get busy and finance the design of a new and better twin engined airliner.

And this was just what the company did. In March, 1934, the first Lockheed "Electra" took off from the Burbank airport on its maiden test flight. Gross and Lockheed had had plenty of trouble financing this venture. But now

it was safely launched and soon orders began to flow in from all parts of the world. The successful Electra also formed the foundation for many other Lockheed designs such as the Lockheed 12 and 14. With the British order for the Hudson variant of this basic configuration, early in World War II, Lockheed was on its way. So now they are one of the world's leading airplane manufacturers. And it all started with an idea, a bold spirit, a financial faith in the future—and the result was the Electra and success.

Financing Problems: Today, except for small aircraft, it is very difficult for a company to finance such a venture as the Electra. For the major purchaser, the government, usually keeps profit levels low, and on the other side of the ledger airplanes are generally larger and more complex, and they require many hundreds or even thousands of hours of test flying—which usually dictates having a number of prototype models. All this adds up to more and more design and development money that must be eked out of meagre profits.

Moreover, World War II brought forth a basic aircraft design industry that is founded on large manufacturers. These blossomed out from the wartime demands for the high rate production necessary to try and satisfy the unquenchable thirst of the war in the air. And they stayed large with the increasing complexity of their products. So instead of having an aircraft, engine, and accessory industry composed of small, low overhead, flexible companies, we now have one of large, high overhead, inflexible ones. As Vannevar Bush said, the "large private enterprise has its limitations on innovations when they are off the beaten track and expensive."

Many of these big companies, too, were fed on such large scale production orders during 1939 to '45 that they had forgotten what it was to put any money of their own into new developments. Then, just as the picture might have changed, along came the Korean conflict and the contractors were again flooded with orders. Thus it has only been in the last few years that tighter military budgets and spiraling costs have forced the companies to take a hard look at development projects that will revitalize their dwindling production lines.

New Approach: As all this has been

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NEW CESSNA OWNER: Canadian television star Joan Fairfax is seen taking delivery of her new Cessna 172 from Trev Acfield, sales manager for Sanderson Aircraft Limited, Malton, Ontario. Sanderson Aircraft is a distributor for Cessna.

for use with either liquid or dry chemicals. It is equipped with a 110 gallon hopper loaded through a large hatch aft of the wing. As a sprayer, it can apply agricultural chemicals 70 feet wide with a working swath of 50 feet. The PA-18-A is powered with a 150 hp Lycoming engine.

CANADAIR TRAINER

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crystallized at this time.

Preliminary design is now under way on the inclusion of an armament pack, not only for training but to give this multi-purpose aircraft a practical ground support role. In addition, there will probably be an eventual rearrangement of the interior to make it a four-seater aircraft which can be used for many purposes.

The design program has been under the direction of W.K. Ebel, vice-president engineering, and E. B. Schaefer, chief engineer. E. H. Higgins is projection of the program.

FINANCIAL FAITH

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going on the contracting agencies in the Western World have been wondering too how they could finance some of these new developments. And all too often their thoughts have been tinged by memories of too many company brochures that promised the moon for a few dollars—but the budget finally swelled into millions before the prom-

ised product was delivered. The net result of these analyses, from both sides of the fence, has been this new approach to financing new developments. Now the contractor is asked to put up at least some of his own funds during the development period. He may or may not get his money back depending on the success of the venture. Or he may never get it back during development but must rely on a production contract to pick up his profit.

This is a new thing under the contractual sun, and a potent one. For the manufacturer who is going to survive in this cold war age will be the one who will accept this deal, show his financial faith in his future, and use this as an enthusiastic spur to completing a successful job in minimum time at minimum cost.

In Canada, I think, we have been fortunate with our contractors and our programs. "Few countries of comparable population have been so fortunate as Canada in having since 1945, a continuing policy of development and production," said J. Lukasiewicz, Head of the High Speed Aerodynamic Laboratory at the NRC last year in the CAI Journal. Moreover, when this monetary challenge faced the industry they generally responded with some of their own financial backing for their development programs. Avro Aircraft Limited, designers and builders of the CF-100 fighter, and now the Arrow supersonic interceptor, have carried a few programs during past developments.

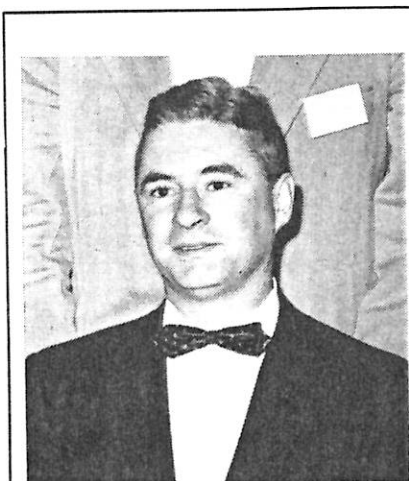
The Iroquois: An even greater record has been established by their sister company, Orenda Engines Limited. Orenda, when the Arrow design started, realized that it would only have a place in the program if they financed it themselves. This was the start of the Iroquois jet engine that will soon power the Arrow. Orenda started the design on its own funds, and carried it until the first engine was running. When the Iroquois had proven its possibilities then, and only then, did Orenda cash in on a government contract.

A similar pioneering spirit has been shown by The de Havilland Aircraft of Canada when it plunged into the design and development of the popular Beaver transport. Then it followed this up with its own funds, and some assistance, in the design of the Otter aircraft. De Havilland is now working

a similar deal on its present design, the twin engined Caribou. Recently Canadair, too, has announced that it is designing and building a jet trainer from its own resources. And in nearly all these cases there is a host of subcontractors, large and small, that share the faith of the prime contractor and do their part with at least some of their own funds. With all these, and many other companies scattered across Canada, there is a true pioneering spirit that bodes well for the future of our civil and military air power.

It is easy to sit on the sidelines and survey this Canadian scene without realizing that our contractors have risked much in this difficult transition period. Moreover, the contracting agencies must allow a reasonable profit margin for the successful development, or we will milk the industry dry in the long run. However, as William Bradford, Governor of the Plymouth Plantations in the 17th Century once said, "All great and honorable actions are accompanied by great difficulties, and must be both enterprised and overcome with answerable courages." And I would say that the industry has met this contractual challenge with true financial courage.

S. H. Deeks, Executive Director of the Industrial Foundation on Education said early this year, "Only clear decisive action wisely administered can keep us, joined with our partners in freedom, secure and progressive." And I would say that our industry has taken this action. With them, I'm sure, our aeronautical future is secure.



GUEST SPEAKER: Bryan S. Wood, a staff engineer at Avro Aircraft Ltd., was a speaker at the Vickers 7th Aircraft Hydraulics Conference held Nov. 12 and 13 in Detroit, Michigan. Mr. Wood's topic was "Practical Experience With a 4000 PSI System."