

DIRECTORATE OF OPERATIONAL  
SERVICES OVERSEAS  
CIVIL AVIATION DEPARTMENT  
THE BOARD OF TRADE  
LONDON

FALKLAND ISLANDS

FLYING BOAT OPERATION BETWEEN THE  
FALKLAND ISLANDS & SOUTH AMERICA

Prepared by: R J Wainwright

April 1970

FLYING BOAT OPERATION BETWEEN THE FALKLAND ISLANDS AND SOUTH AMERICA

- Contents:
1. Introduction
  2. Operational Requirement
    - 2.1. Air Routes
    - 2.2. Aircraft
  3. Ground Services at Port Stanley
  4. Water Aerodromes
  5. Assessment
  6. Conclusions

- Appendices:
- A. Specification of McKinnon Turboprop Goose Amphibian Aircraft
  - B. Canadair CL-215: Cost Estimate
  - C. Photographs

## 1. INTRODUCTION

- 1.1 In April 1969 a survey was carried out in the Falkland Islands by the Board of Trade, in co-operation with the Ministry of Public Building and Works, to determine the feasibility of establishing an airfield in the Cape Pembroke area of the Falkland Islands. This airfield would be for use by aircraft operating between the Falkland Islands and South America. The survey was carried out by Mr R J Wainwright, an Operations Officer in the Civil Aviation Department of the Board of Trade and Mr F J Botham, a Civil Engineer of the Airfields section of the Ministry of Public Building and Works; their Report entitled "Falkland Islands: A Report on the Feasibility of constructing an Airfield on The Cape Pembroke Peninsula", concluded that an airfield could be provided at a minimum cost of £230,000.
- 1.2 The Falkland Island Government has indicated that it wishes to consider all possible methods of providing air services to South America, and has asked that information should be provided upon the possible use of flying boats as a possible alternative to providing an aerodrome for land-plane operations. These notes should be considered as supplementary to the Report on the Cape Pembroke airfield.

## 2. OPERATIONAL REQUIREMENT

- 2.1 AIR ROUTES: In considering the aerodrome requirement at Cape Pembroke, it was considered that the initial route requirement between the Falkland Islands and South America would be from Port Stanley to Punta Arenas in Chile: the distance over this route is 488 nm. Operational calculations applicable to the route would provide satisfactory guidance to operations over routes of similar length to Argentinean airfields (Rio Gallego, Comodora Rivadavia) if these should become available in the future. A route sector of 500 nm has therefore been taken as the requirement for a flying boat (amphibian) operation.

### 2.2 AIRCRAFT

2.2.1 Although flying boats were extensively developed prior to and immediately after the 1939-45 War, leading up to the Princess-type flying boats, these aircraft have since steadily become obsolete; except for a few very specialised types, no new transport flying boat or amphibian aircraft design has been developed since 1946. As a result of this type obsolescence, there is only a very limited range of transport flying boats or amphibians now available from which to select aircraft suitable for the Falkland Islands. There are no public transport flying boats or amphibians on the United Kingdom Register. Aircraft which are currently available, and which have been considered as possibly suitable for the proposed operations, are the Grumman Goose (Standard and Turbo models), Consolidated Catalina, and the Canadair CL-215. Both the Grumman Goose and the Catalina are aircraft that have been out of production for some years, and the aircraft now in service are

the product of specialist firms or airline companies which convert and rebuild the aircraft; the Canadair CL-215 is a new aircraft designed basically as an aerial fire-engine, carrying water for dropping on forest-fires, etc, but it is also available as a utility transport aircraft.

2.2.2 GRUMMAN GOOSE. This aircraft was originally designed and constructed by the Grumman Airplane Company, USA. This company no longer manufactures flying boats and this aircraft has been out of production for some years. These aircraft are currently available in modified, rebuilt form from McKinnon Enterprises Inc, a reputable American specialist aircraft constructor; the aircraft are certified to American FAA standards. Two basic models have been considered for the Falkland Islands:-

(a) Standard Goose (G.21A), fitted with two Pratt and Whitney R-985 piston engines, operating at maximum Take-off weight of 8920 lbs.

(b) McKinnon Turbo Goose (G.21D-G.21G), fitted with two Pratt and Whitney PT6A turbine engines, operating at Maximum Take-off Weights up to 12,500 lbs.

The piston-engined Standard Goose with normal fuel capacity, which would allow a passenger load of four/five, cannot meet the proposed sector distance requirement. Range can be extended by fitting extra fuel tanks, but this would only permit a marginal operation and would reduce passenger load to two or three passengers. The cost of this aircraft, fitted with long-range tanks, and supplied with spares including one spare engine, would be of the order of \$112,000 (£46,670). The McKinnon Turbo Goose (latest mark G-21G) is designed to accommodate eight to twelve passengers; the basic production model is fitted to carry eight. With normal tankage of the aircraft has a still air range of approximately 950 sm; with a "wet" wing giving extra fuel capacity the aircraft has a still air range of 1600 sm. In both of these cases it is estimated that the Falkland Island - Punta Arenas operation should be within the aircraft's capability; the aircraft should be able to carry at least the basic eight passenger load over the proposed route sector. Full performance data is not available, but the manufacturer claims a take-off distance to 50 feet, from water, of approximately 4,500 feet; two engine climb capability of 1500-1600 ft/minute, and single-engine climb at maximum weight to 5000 or 7500 feet, depending upon the mark of aircraft. Manufacturers' specifications and performance information are listed in Appendix A. Airline operator comment on these aircraft is that performance is "of superb standard". The price of the Turbo-Goose, completely rebuilt and as new, FAA certificated, is \$375,000 for the shorter-range model with a total fuel capacity of 336 US gallons; the longer-range model, having a fuel capacity of 586 US gallons, is \$415,500. Radio and navigation equipment is installed to customer's requirements at extra cost. A spare engine would cost approximately \$50,000. It is estimated that the total cost of the longer-range aircraft, with spare engine and other spares, could be of the order of \$480,000 (£200,000).

2.2.3 'CATALINA' AIRCRAFT. These aircraft are conversions of the military Consolidated Catalina PBY amphibians, and are presently operated by Alaska Airlines: it is believed that the aircraft is also operated by a subsidiary of another American airline. The

aircraft are fully modified for civil operations, are certificated to FAA regulations, and carry 28 passengers. It is fitted with two Wright 2600 engines, and has excellent long-range capability. No performance details are available, but it is thought that the aircraft may require a fairly long field length from which to operate, and that its rate of climb on one engine might not be adequate for climb-out to the west in Port Stanley Harbour. The cost of one "Super Catalina" equipped with zero-time engines and propellers, with hull and systems checked and completely reconditioned as necessary, and with one spare engine and basic spares, would be estimated at \$175,000 US (£73,000). Although these aircraft are comparatively cheap, it has not been possible to obtain sufficient technical data to enable a fair assessment of the aircraft's potential value to be made.

2.2.4 CANADAIR CL-215: This aircraft is a twin-engine amphibian manufactured by Canadair Ltd of Montreal. As a utility transport it is currently certificated by the Canadian Department of Transport for the carriage of non-fare-paying passengers and cargo in Government or private operations. It is expected that Canadian certification for the carriage of fare-paying passengers on non-scheduled flights will be completed in mid-1970. The aircraft operates at a maximum weight of 36,000 lb, has a wing-span of 94 feet, and fuselage length of 65 feet. It is powered by two Pratt & Whitney R.2800 83 AM-2 engines with Hamilton Standard propellers. Two-engine take-off distance to 50 feet, from water, is 2440 feet: take-off distance is 6390 feet (FAR). Detailed performance data is not available; the manufacturer's specification states that steep climb out and approach angles permit operations in restricted areas. A roll rate of 16° per second and turning radius of approximately 230 metres allows manoeuvring in restricted areas. The aircraft could operate between Stanley and Punta Arenas, carrying estimated payloads of 3000 lbs (15 passengers) westbound and 5000 lb (25 passengers) eastbound. A study of the estimated direct operating costs of the CL-215, prepared by the manufacturer and based upon its use in the Falkland Islands, indicates total direct operating costs of £119. 16. Od./hour for an annual utilisation of 500 hours. The approximate cost of the aircraft is £427,450 with supporting spares valued at £98,039, making a total cost of £525,489. (Full details of the survey of operating costs are attached at Appendix B).

### 3. GROUND SERVICES AT PORT STANLEY

- 3.1 Operation of any of the aircraft discussed in paragraph 2 will require the improvement of the slipway and hangar accommodation at Port Stanley. In the case of the CL-215, it is considered that a ramp width of 60 feet, inclined at 10% maximum, with its seaward extremity a minimum of 7 feet below the water surface under low tide conditions, would be satisfactory; a hangar would need to be 66 feet deep, with a frontal entrance at least 30 feet high and 95 feet wide.
- 3.2 Flying boat operations to South America would require the provision at Stanley of at least the radio communications and navigation facilities discussed in the Report on the Cape Pembroke Area (see paragraph 1). The possible cost of air/ground communications equipment was estimated in the Report to be of the order of £23,000.

#### 4. WATER AERODROMES

- 4.1 Amphibian aircraft of the types discussed in paragraph 2 require areas of reasonably sheltered water from which to operate. It is considered that Port Stanley harbour would be satisfactory for this purpose, providing sufficient distance for take-off run and landing. In certain circumstances, dependent upon the take-off climb performance of a particular aircraft, it might be necessary to operate from the extreme eastern end of the harbour, to ensure adequate clearance of the rising ground on the north and south sides of the harbour.
- 4.2 It is reasonable to suppose that similar water aerodromes locations can be established in the Islands, in the approaches to Darwin Harbour, Port San Carlos, and Fox Bay.

#### 5. ASSESSMENT

- 5.1 On the information available, it is considered that the long-range McKinnon Turbo-Goose G-21G is the most suited to the Falkland Island traffic and operational requirement. Alternative aircraft would be either too big or much too expensive for present needs. The size and load capacity of the Turbo-Goose is such that, in addition to operation to Punta Arenas, utilisation could be increased by employing the aircraft on selected sectors within the Falkland Islands internal services. The aircraft is not certificated to British Civil Airworthiness Requirements; if required to be so, it should be certificated in Performance Group "C" for Public Transport Aircraft.
- 5.2 The accuracy of the performance data discussed in respect of this aircraft cannot be guaranteed, and if any aircraft were to be purchased, aircraft specifications and performance requirements would need to be considered in particular detail with the supplier of the aircraft.
- 5.3 The merits of using an amphibian aircraft, operated from the Falkland Islands, to provide an air service to South America are primarily that no land aerodrome construction or maintenance costs are involved and that a regular air service could probably be put into operation much earlier, if an immediate decision were made, than would be possible by providing a land aerodrome and awaiting the development of operations from South America. The standard of flight operations, including safety standards, would be under the direct control of the Falkland Island Government. The availability of emergency water landing areas would also provide for better regularity of service than could be offered by land planes which might, on occasions, be obliged to return to the mainland in conditions of really bad weather.
- 5.3 The disadvantages of providing an amphibian service are that the initial capital costs are high, approaching the cost of a land aerodrome. The direct operating costs are also high - very much higher than maintenance costs on an aerodrome which can be serviced at low cost by existing labour forces. Because of the limited traffic available in the Islands, utilisation of the aircraft on the mainland service would be low, and the service could only be operated at a loss. The use of an amphibian could be a comparatively short-term policy; the obsolescence of flying boats and amphibians,

and the exceptionally limited choice of aircraft, make it highly likely that no satisfactory replacement would be available at the end of the useful life of current aircraft.

6. CONCLUSIONS

6.1 It is concluded that:-

(a) an amphibian flying boat air service between the Falkland Islands and South America is technically feasible, subject to satisfactory certification of the selected aircraft.

(b) such a service would require very substantial capital investment, that operating costs would be very high, and that the service would be very expensive to operate.

(c) it could not be guaranteed that an amphibian flying boat service could be continued, on a long-term basis, beyond the life of presently-available aircraft.

McKinnon Turboprop Goose Amphibian Aircraft

Model G-21G

Power Plants	Two Pratt and Whitney PT6A-27 680 SHP
Engine TBO	2000 hours
Propellers	Hartzell 3-blade, constant speed, full-feathering reversible.
Maximum Gross wt	12,500 lbs
Equipped Empty wt (approx)	6,700 lbs
Useful load (approx)	5,800 lbs
Fuel capacity available	586 US galls
Range	1600 sm
Maximum operating speed	236 mph
Ceiling	20,000 feet
Single Engine Ceiling	15,000 feet
Wing span	50.8 feet
Length	43.8 feet
Height	14.5 feet

(The above data is manufacturer's published information).



CANADAIR CL-215  
ESTIMATES OF DIRECT OPERATING COSTS  
IN FALKLAND ISLANDS OPERATIONS

## ASSUMPTIONS

1. The aircraft is valued at \$1,090,000 Canadian dollars (£427,450) for the purpose of depreciation. This figure is not to be used for contractual purposes.
2. The depreciation policy is 15 years to 20 percent; this figure is within the design concept allowance.
3. The Hull Insurance at 7 percent is a figure given on similar operations by experienced operators.
4. The aircraft will be flown by experienced amphibian aircraft pilots. The rates of pay assumed are the minimum rates recommended by the British Airline Pilot Association.

All costs and prices are in Canadian dollars and converted to sterling at the rate of \$2.55 to one pound sterling.

## CREW

	Pilot Salary*	£2,500	
	Co-Pilot*	1,500	
		£4,000	
		<hr style="width: 50%; margin: 0 auto;"/>	
at 500 hours per year crew utilization	£4,000	£8. 0. Od./hr.	
		<hr style="width: 50%; margin: 0 auto;"/>	
		500 hrs.	

\*(Minimum rates as agreed by the British Airline Pilots Association)

## FUEL &amp; OIL

Fuel at 140 Imperial gallons per hour

Average fuel cost per Imperial gallon 0. 4. 3d.

Average oil consumption 3 Imperial gallons per hour

Average oil cost per Imperial gallon 0. 15. 0d.

Fuel 140 Imp.gal./hrs. x 4s. 3d.

£29. 15. 0d.

Oil 3 Imp.gal./hrs. x 15s. 0d.

£ 2. 5. 0d.

Total Fuel &amp; Oil

£32. 0. 0d./hr.

## MAINTENANCE

## Labour

Licenced Engineer  
Helper£2,500  
500£3,000£3,000  
500 hrs.

= £ 6. 0. 0d./hr.

## Materials

Engines and Propellers  
Purchase parts  
Manufacturers items£1. 2. 0d./hr.  
£1. 18. 0d./hr.  
£6. 2. 0d./hr.£9. 2. 0d./hr.

£ 9. 2. 0d./hr.

## Outside Repair

Engine, overhaul  
Overhaul period£6,274. 10. 0d.  
800 hours2 x £6,274. 10. 0d.  
800

=

£15. 14. 0d.

£15. 14. 0d./hr.

Propeller overhaul  
Overhaul period£784. 6. 0d.  
2,0002 x £784. 6. 0d.  
2,000

=

15. 0d.

£ 0. 15. 0d./hr.

Total Direct Maintenance Costs/Flight Hour

£31. 11. 0d./hr.

## INSURANCE

Insurance Rate 7 per cent

Hull Insurance £427,450 at 7 percent £29,918

Annual Insurance £29,918

## DEPRECIATION

Depreciation Policy, 15 years to 20 percent Residual

Basic Aircraft Cost - £427,450 £427,450

Less Residual Value £ 85,490

£341,960

Annual Depreciation £22,797

## SPARES

(Depreciation Policy 15 years to 20 percent)

Spares &amp; G.S.E. - £98,039 £ 98,039

Less Residual Value £ 19,807

£ 78,232

Annual Depreciation £ 5,215

## COST CALCULATION

Hourly Costs - Crew £ 8. 0. Od.

Fuel &amp; Oil 32. 0. Od.

Maintenance 31. 11. Od.

£ 71. 11. Od.

Annual Cost - Depreciation of aircraft £22,797

- Depreciation of Spares 5,215

- Insurance 29,918£57,930

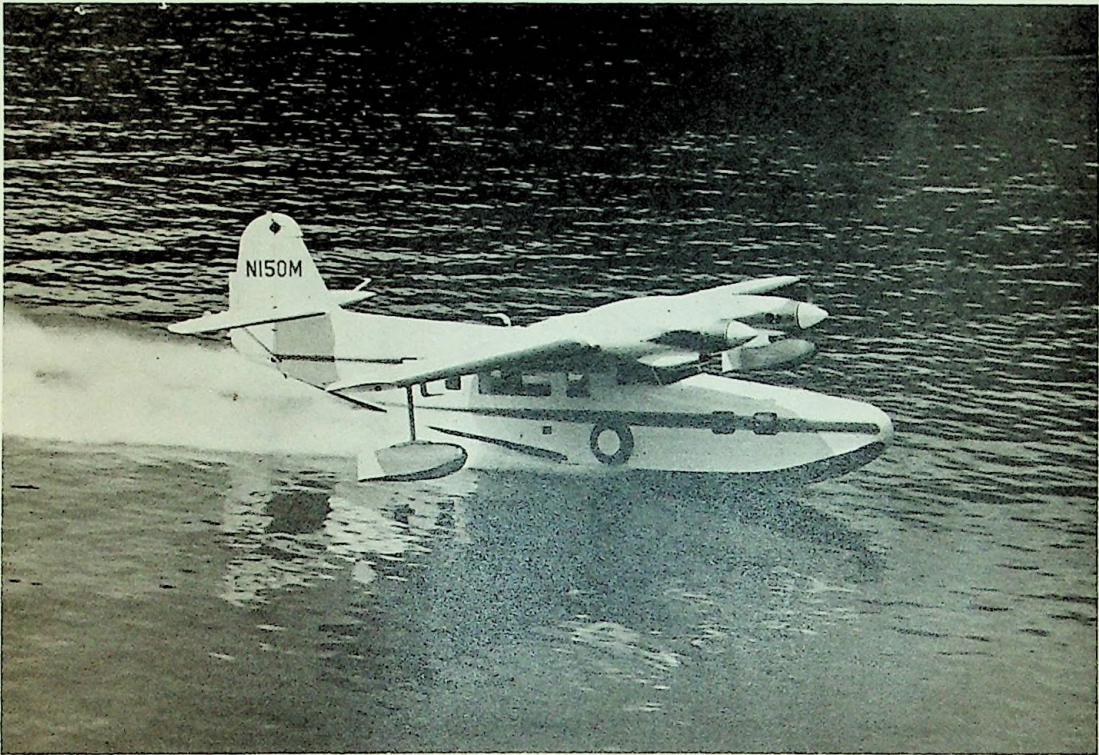
Annual Costs expressed in rate per hour

£57,930  
500 hrs.£115. 17. Od.

£187. 8. Od./hr.

Total Direct Operating Costs 500 hours	£187. 8. Od./hr.
Total Direct Operating Costs 750 hours	£148. 16. Od./hr.
Total Direct Operating Costs 1,000 hours	£129. 11. Od./hr.
Total Direct Operating Costs 1,200 hours	£119. 16. Od./hr.

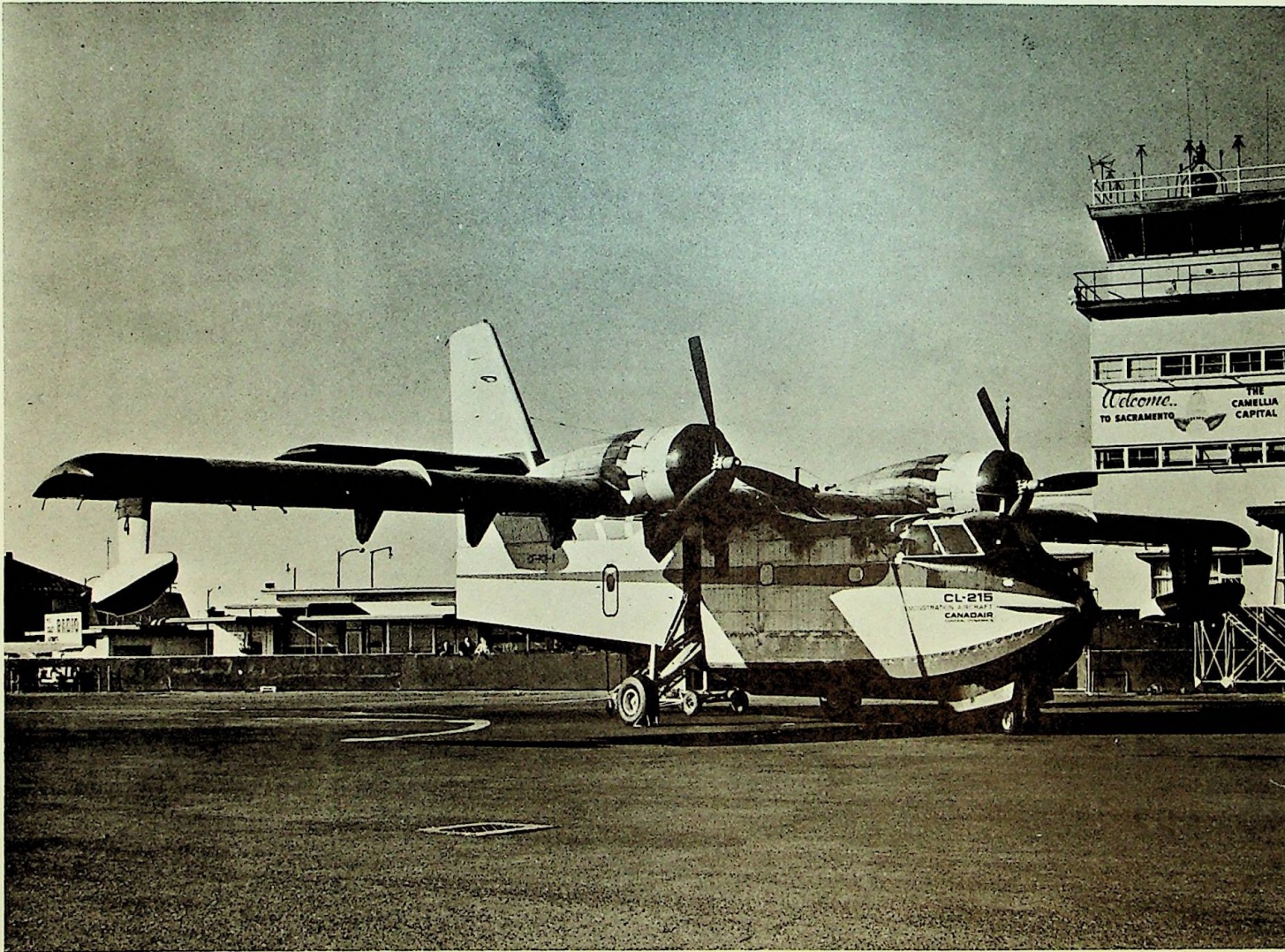
FALKLAND ISLANDS



GRUMMAN McKINNAN TURBO GOOSE AIRCRAFT

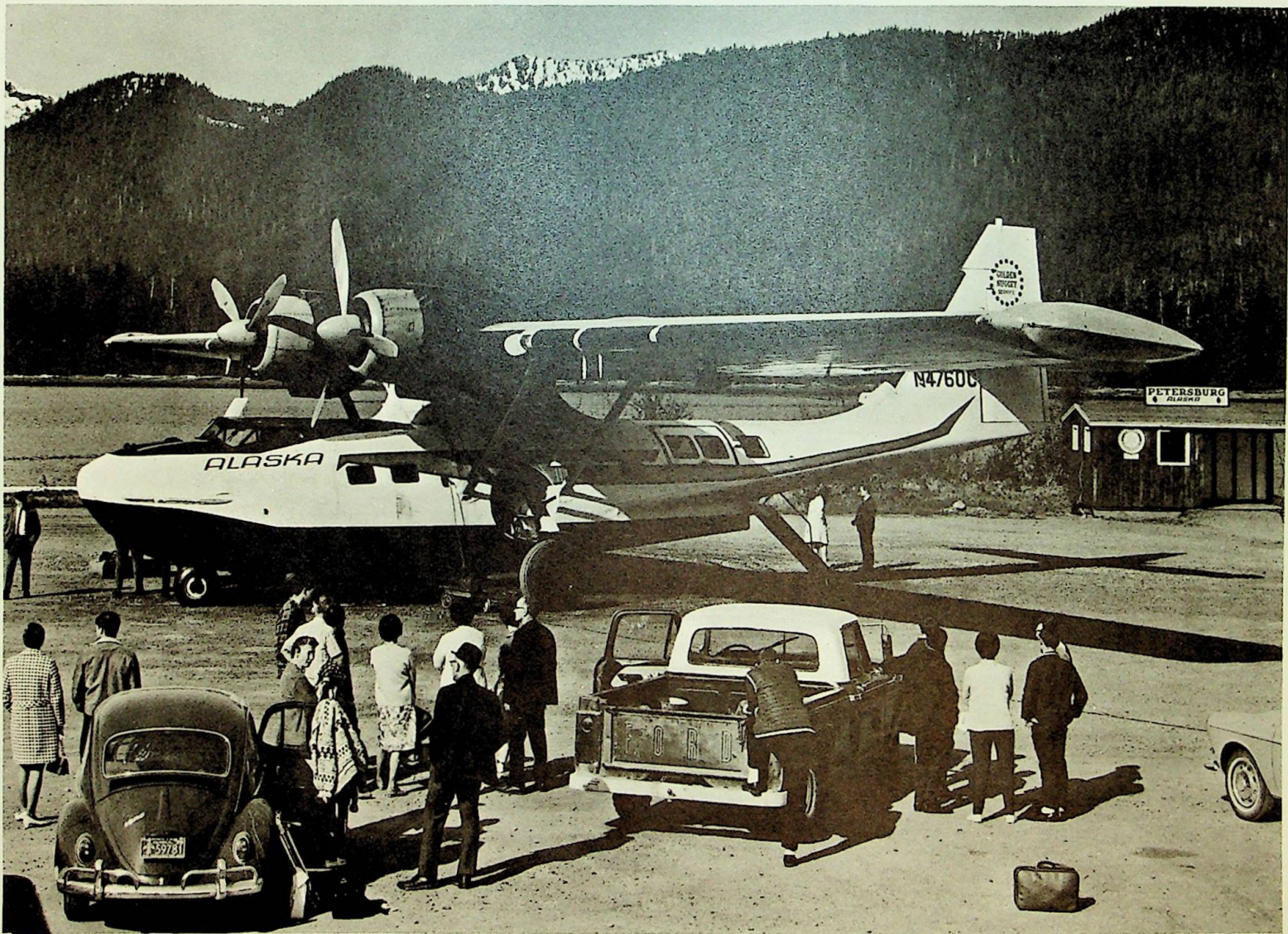


GRUMMAN McKINNAN TURBO GOOSE AIRCRAFT (G-21G)



FALKLAND ISLANDS

CANADAIR CL-215 AMPHIBIAN



FALKLAND ISLANDS

SUPER CATALINA AMPHIBIAN  
AS OPERATED by ALASKA AIRLINES