



THE DE HAVILLAND CANADA

Caribou



The DHC-4 A Caribou

Steep approach, wide angle cockpit visibility and excellent control at low approach speeds enable the pilot to pick with precision the point on the strip for touch-down. Ultra short landing roll coupled with the long-stroke, rugged landing gear, makes year-round operation possible from unimproved thousand-foot jungle, bush or desert landing strips.

Introduction—

The DHC-4A Caribou introduces a new concept in transport aircraft design. Basically it is a twin-engine passenger-cargo aircraft capable of carrying payloads up to 4¼ tons (3856 kg) but its ability to operate from short, improvised air strips makes it unique.

Exceptional short take-off and landing characteristics enable this aircraft to operate in and out of tiny jungle landing strips, from beachheads or from short fields located close in to centres of population — heretofore accessible only to light airplanes. The Caribou is designed to take-off and clear a 50-foot (15 m) obstacle in a distance of 1185 feet (361 m) with zero wind.

The aerodynamic features which provide short-field performance and low-speed handling qualities are based on known quantities — the wealth of experience which has been gained in the development of the STOL Beaver and Otter, whose operational capabilities have been demonstrated in some 62 countries on 7 Continents throughout the world.

The DHC-4A structure is conventional, simple, and rugged; it is capable of absorbing maximum punishment with a minimum of field maintenance.

Large rear loading doors provide access to the 1150 cubic foot cabin, and also permit rapid jettisoning of cargo in airborne operations. The Caribou cabin is readily convertible to any one of several configurations: as a civil transport, it accommodates 30 passengers and baggage; as a troop transport 32 fully equipped combat troops may be carried. The rear doors may be opened in flight to allow troops to be dropped from the air or disembarked on the ground in a minimum of time. The air ambulance will take 22 stretcher cases, or various combinations of stretcher or ambulatory patients and medical attendants.

In its military role, the Caribou is designed to operate from short, improvised air strips in close support of the Army in forward battle areas — carrying out aerial supply dropping, transportation of men and materials and casualty evacuation.

The full span double slotted flaps and large tail area provide excellent control and manoeuvrability, particularly for low-level, low-speed operations in forward areas. A wide centre of gravity range allows an unusual variety of cargo loading arrangements.



Take off Performance -

SEA LEVEL
 STANDARD DAY - ZERO WIND
 GROSS WEIGHT - 26,000 LB (11,794 KG) AND 28,500 LB (12,928 KG)
 BOTH ENGINES AT TAKE-OFF POWER (1450 BHP)



SHORT FIELD TECHNIQUE

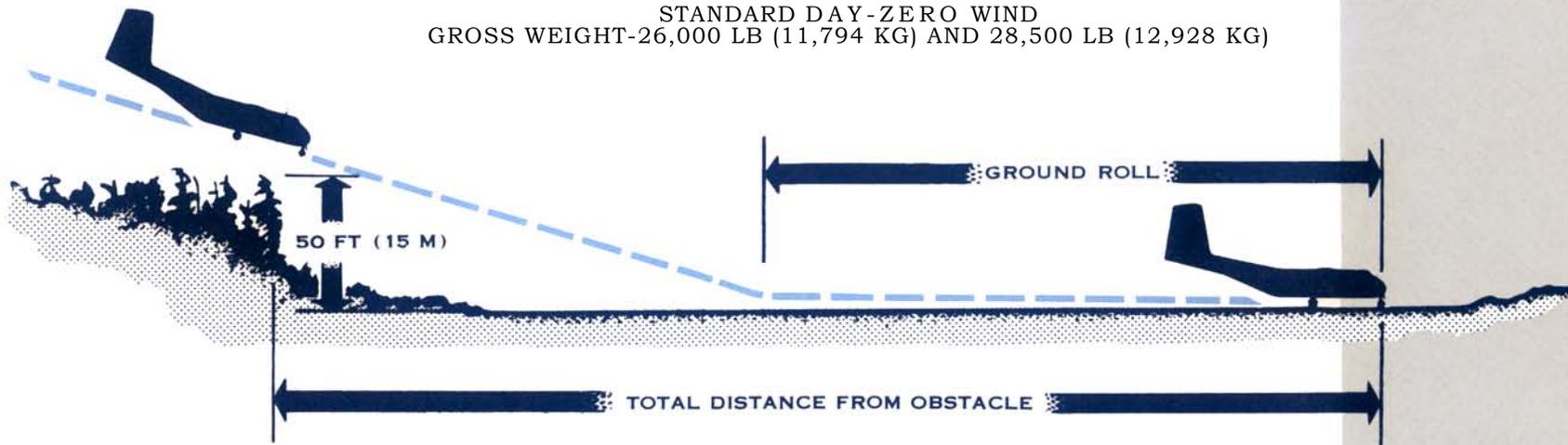
ALL UP WEIGHT	GROUND RUN	TOTAL OVER OBSTACLE	CLIMB GRADIENT (GEAR UP)
26,000 LB	540 FT (165 M)	1020 FT (311 M)	17.6%
28,500 LB	725 FT (221 M)	1185 FT (361 M)	15.2%



Landing Performance -

DHC-4A

SEA LEVEL
 STANDARD DAY - ZERO WIND
 GROSS WEIGHT - 26,000 LB (11,794 KG) AND 28,500 LB (12,928 KG)



SHORT FIELD TECHNIQUE

ALL UP WEIGHT	GROUND ROLL	TOTAL FROM OBSTACLE	DESCENT GRADIENT
26,000 LB	525 FT (160M)	1020 FT (311M)	14.8%
28,500 LB	670 FT (204M)	1235 FT (376M)	16.0%

Leading Particulars -

GENERAL

Gross Weight	28,500 lb	12,928 kg
Basic Weight	17,630 lb	7997 kg
Wing Span	95 ft 7½ in.	29.15 m
Overall Length	72 ft 7 in.	22.12 m
Overall Height	31 ft 9 in.	9.67 m
Wing Area	912 sq ft	84.7 sq m
Wing Loading	31.25 psf	153 kg/sq m
Wing Aspect Ratio	10.0	

CABIN DIMENSIONS

Length	28 ft 9 in.	8.76 m
Width (max.)	87 in.	221 cm
Width (at floor)	73.5 in.	186.7 cm
Height (on center line)	75 in.	190.5 cm
Cabin Capacity	1150 cu ft	32.5 cu m
Max. Floor Loading	200 lb/sq ft	976.4 kg/sq m

DOORS

Loading Doors	{Width	73.5 in.	186.7 cm
	{Height	75 in.	190.5 cm
Side Doors (2)	{Width	30 in.	76.2 cm
	{Height	55 in.	139.7 cm
Crew Hatch	{Width	25 in.	63.5 cm
	{Length	29 in.	73.7 cm

ENGINES

Pratt & Whitney	R-2000 — 7M2	
Take-off Rating.	Sea Level (ISA)	2700 RPM
		1450 BHP
Normal Rated Power.	Sea Level (ISA)	2550 RPM
		1200 BHP
Propeller Drive Ratio	.5:1	
Impeller Ratio	7.15:1	
Power Loading	9.83 lb/BHP	
	4.40 kg/CV/PS	

PROPELLERS

Hamilton Standard 3 Bladed 43D50-7059A-O			
Constant Speed Full Feathering			
Diameter		13.1 ft	3.99 m
Clearances	{Ground Static at AUW	21.9 in	55.6 cm
	{Fuselage	14.45 in.	36.7 cm

ELECTRICAL SYSTEM

24 Volt DC
Two 300 ampere generators

TANK CAPACITIES

Fuel	690 Imp. Gal	829 U.S.	3137 litres
Oil (2)	24.8 Imp. Gal	29.7 U.S.	112.5 litres
Hydraulic	1.5 Imp. Gal	1.8 U.S.	6.8 litres
De-icing (Props)	14 Imp. Gal	16.8 U.S.	63.6 litres

FUEL AND OIL SYSTEMS

10 cells in each wing. Fuel MIL-G-5572 100/130 octane rating.
1 oil tank per engine. Oil MIL-L-6082 Grade 1100

LANDING GEAR

Main Wheel Size	11.00 x 12.	Nominal pressure	40 psi
			2.8 kg/sq cm
Nose Wheel Size	7.50 x 10.	Nominal pressure	40 psi
			2.8 kg/ sq cm
Main Wheel Track	23 ft 1½ in.	7.05 m	
Goodyear Disc Brakes			

FACTORS

Positive, Limit	2.6	
Negative, Limit	-1.4	
CG Forward Limit	31% MAC	} Gear Down
CG Aft Limit	39% MAC	
Design Diving Speed	235 kt	271 mph 435 kph



Rear Loading Door -



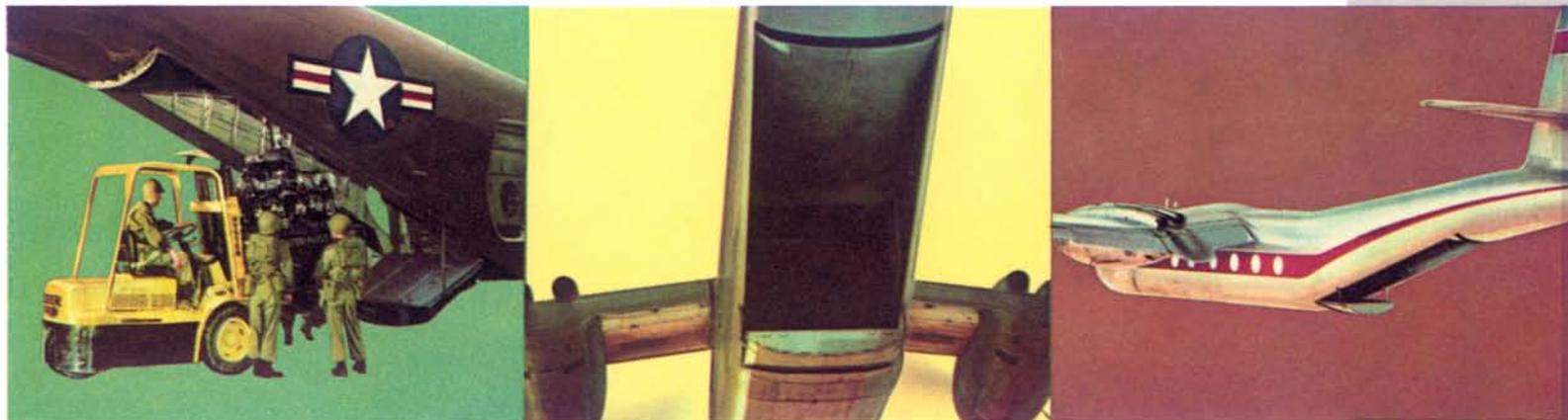
The large rear cargo loading doors facilitate rapid loading of bulky cargo and hence make possible very quick turn-around time on the ground.

The doors are designed to operate in flight for aerial delivery of cargo or military supplies and for dropping paratroopers, "smoke jumpers" and rescue crews.

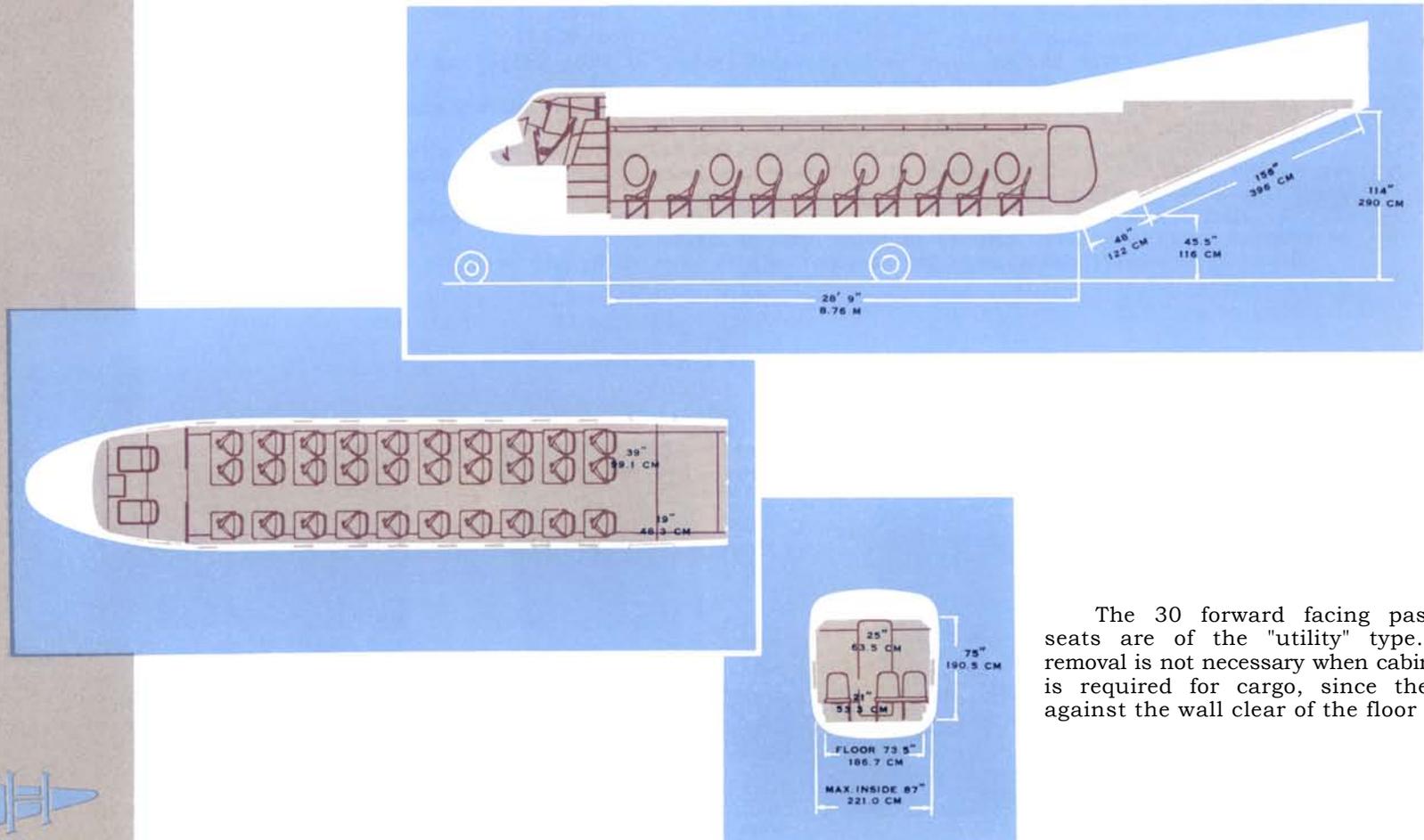
The handling performance of the aircraft in flight is unaffected when flying with the cargo doors open; this makes it possible to carry very long items of cargo, such as pipe, by permitting them to project aft through the partially open doors.

The aircraft can be equipped with strong points to which a parachute anchor cable can be attached, permitting aerial delivery of bulky items of cargo.

Separate passenger loading doors are provided on both sides of the rear fuselage.



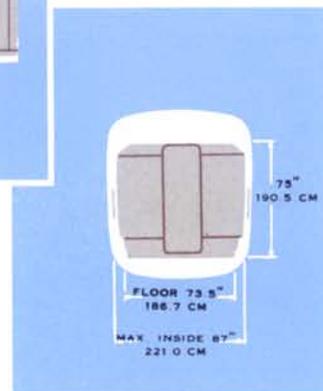
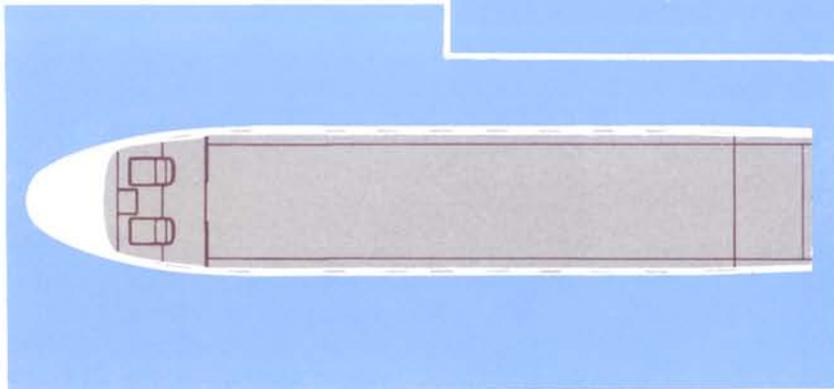
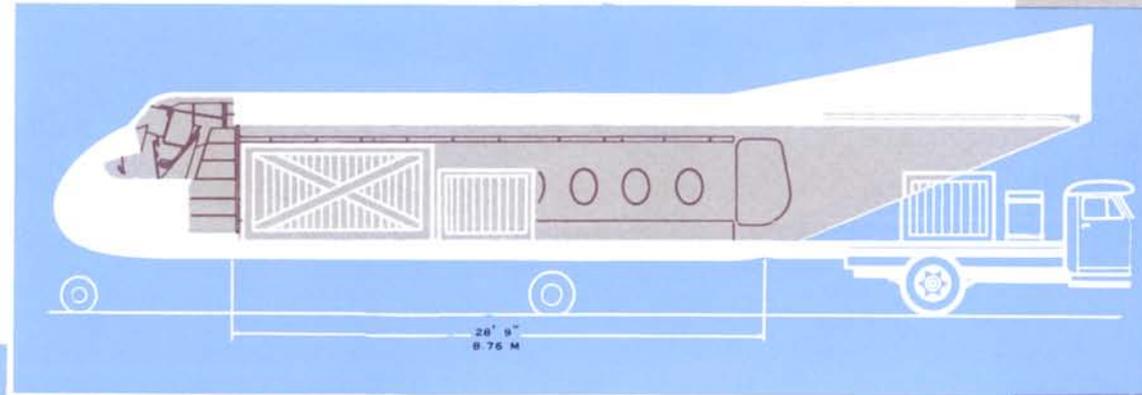
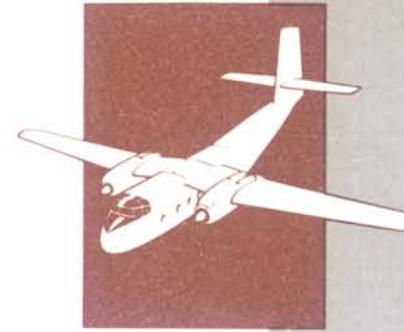
Civil Seating Scheme -



The 30 forward facing passenger seats are of the "utility" type. Their removal is not necessary when cabin space is required for cargo, since they fold against the wall clear of the floor area.

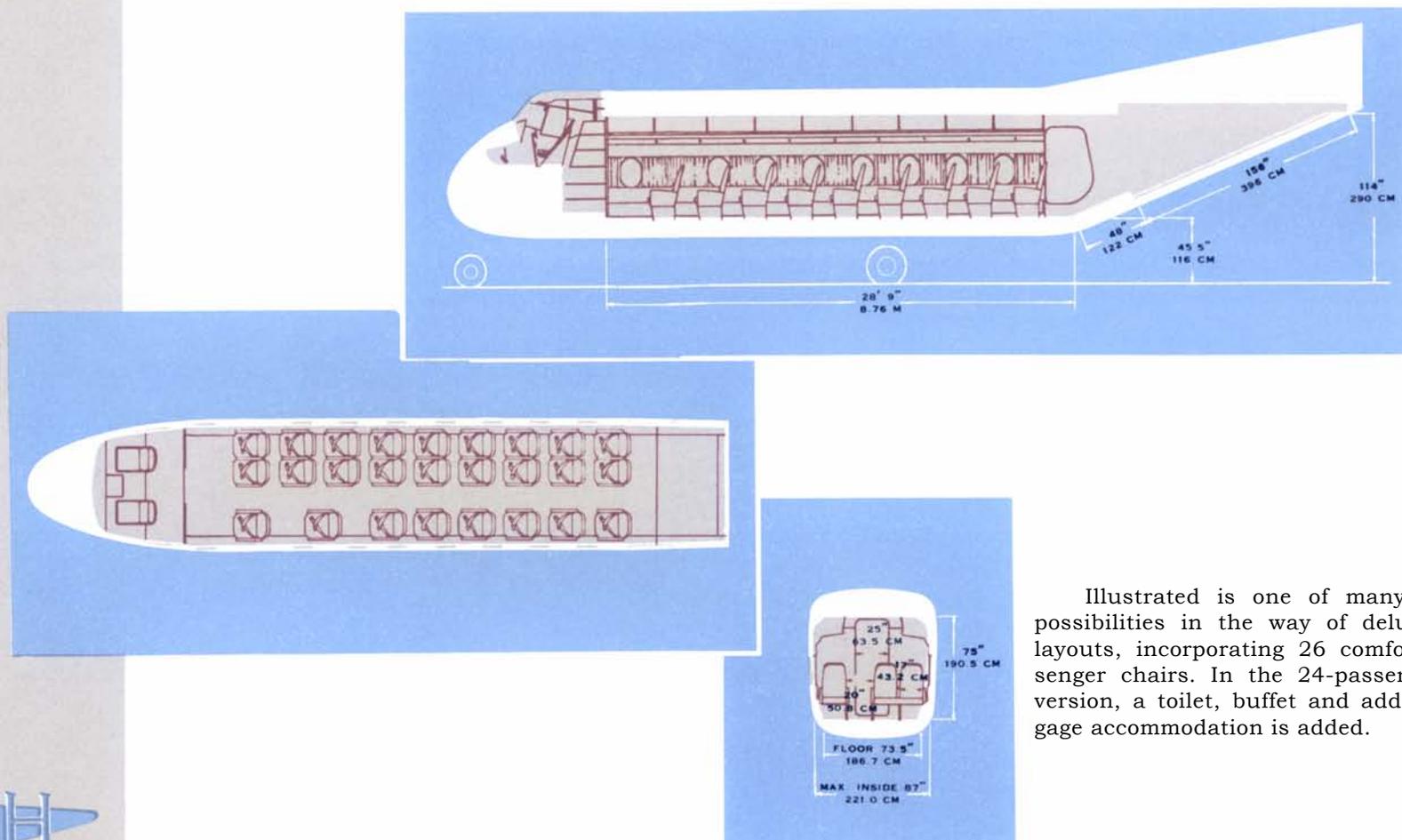


Cargo Loading Scheme—



Cargo tie-down points are liberally provided, permitting full use of the entire floor area. The floor is designed for high density loading — 200 lb/sq ft. Structural provisions are incorporated for a monorail and cargo buffer boards may be provided on the side walls.

Deluxe Passenger Scheme-

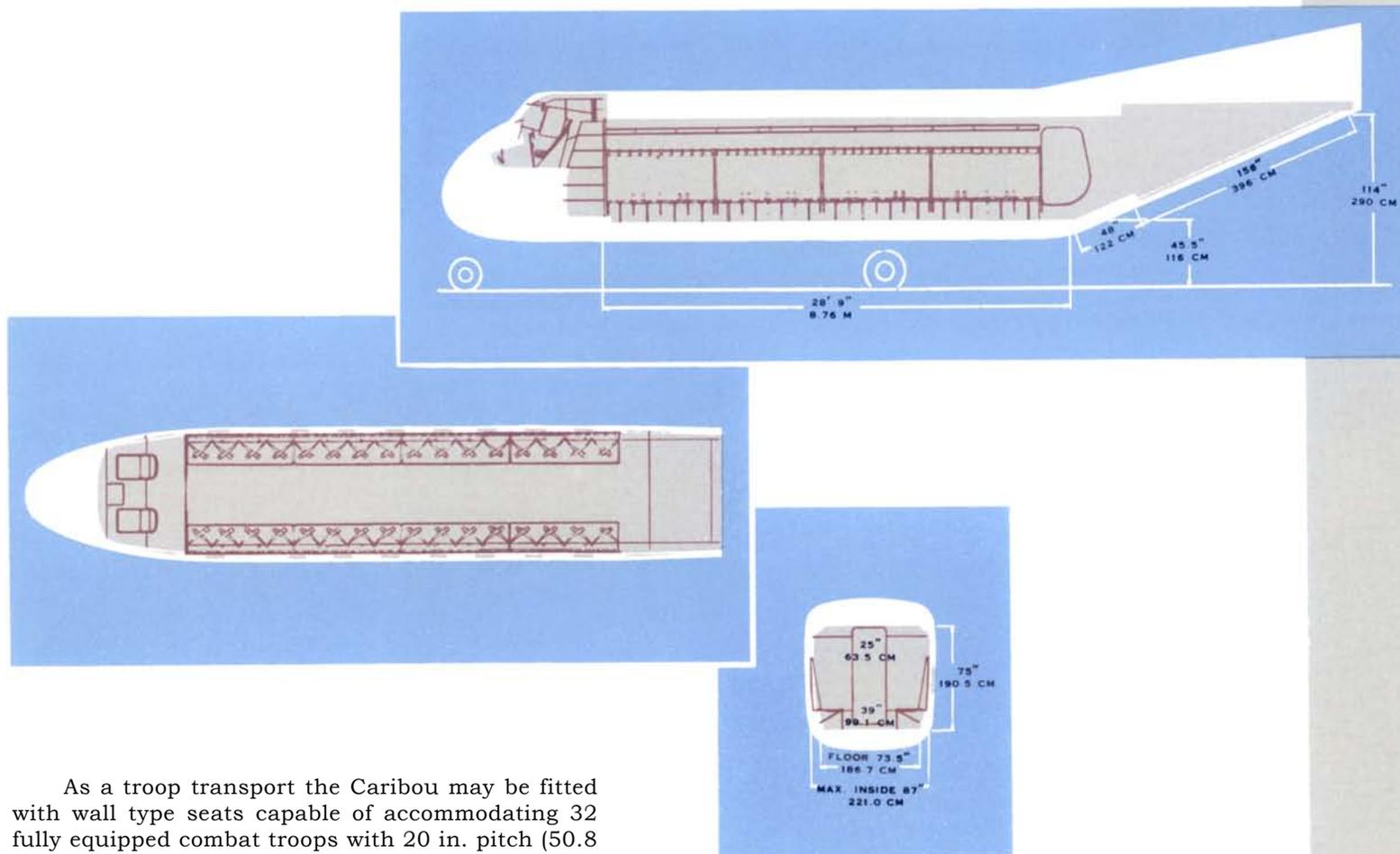


Illustrated is one of many suggested possibilities in the way of deluxe interior layouts, incorporating 26 comfortable passenger chairs. In the 24-passenger deluxe version, a toilet, buffet and additional baggage accommodation is added.



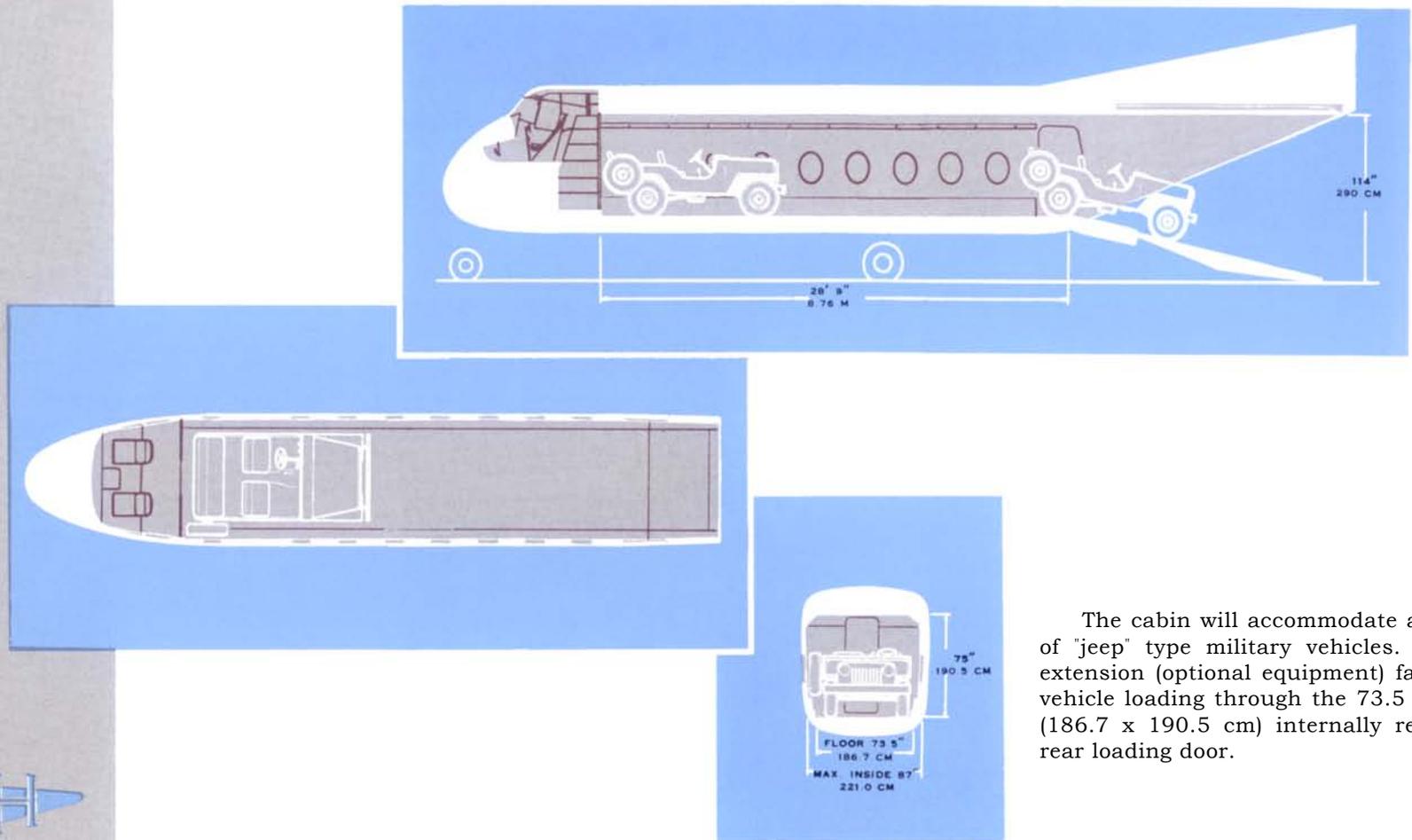
Military Seating Scheme-

DHC-4A



As a troop transport the Caribou may be fitted with wall type seats capable of accommodating 32 fully equipped combat troops with 20 in. pitch (50.8 cm) or 26 paratroopers with 25 in. pitch (63.5 cm).

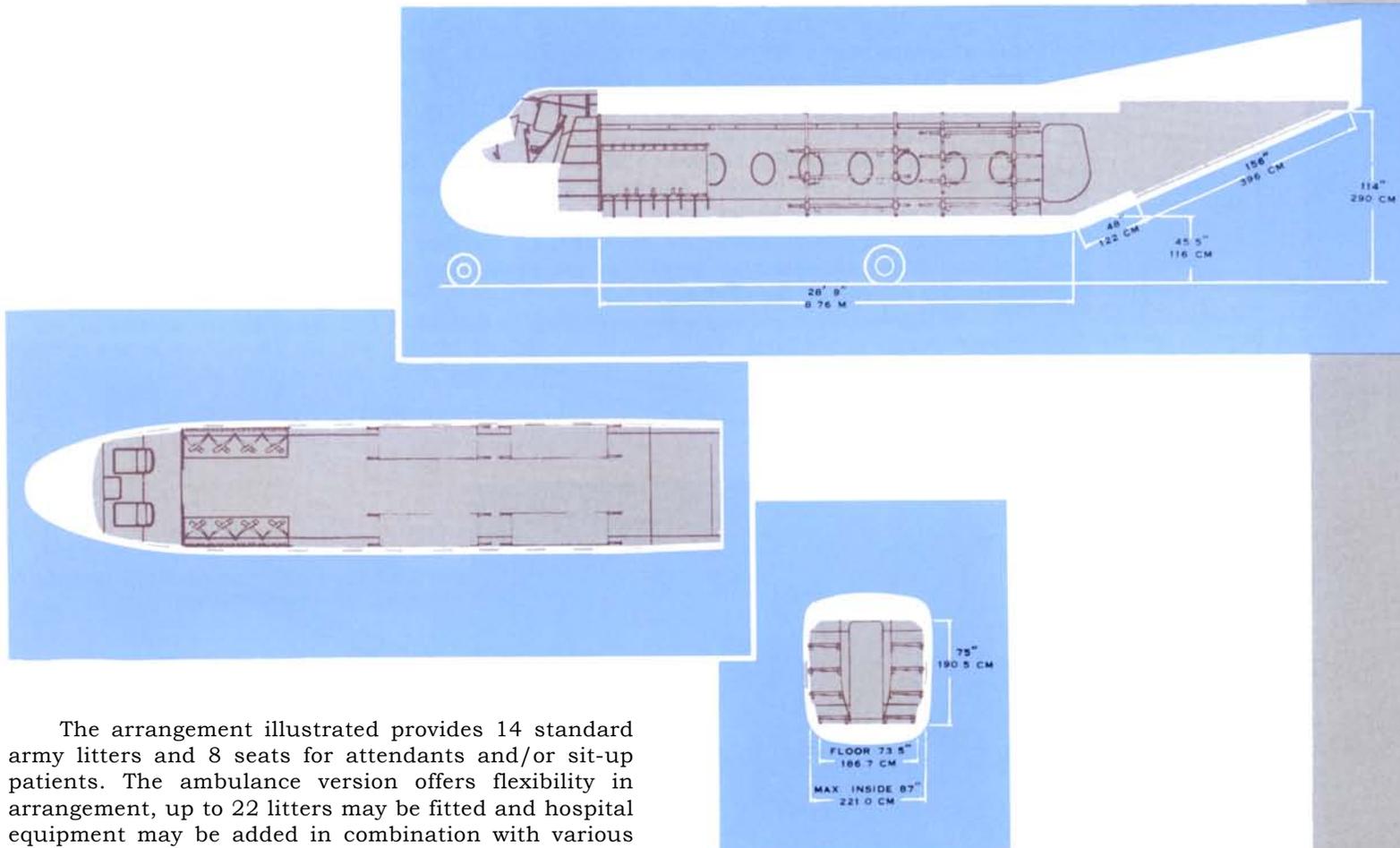
Vehicle Loading Scheme-



The cabin will accommodate a variety of "jeep" type military vehicles. A ramp extension (optional equipment) facilitates vehicle loading through the 73.5 x 75 in. (186.7 x 190.5 cm) internally retracting rear loading door.



Ambulance Scheme—



The arrangement illustrated provides 14 standard army litters and 8 seats for attendants and/or sit-up patients. The ambulance version offers flexibility in arrangement, up to 22 litters may be fitted and hospital equipment may be added in combination with various arrangements of seats and litters.

Power Plant

Chosen to complement the de Havilland Caribou airframe, the Pratt & Whitney R-2000 is an engine of proven reliability.

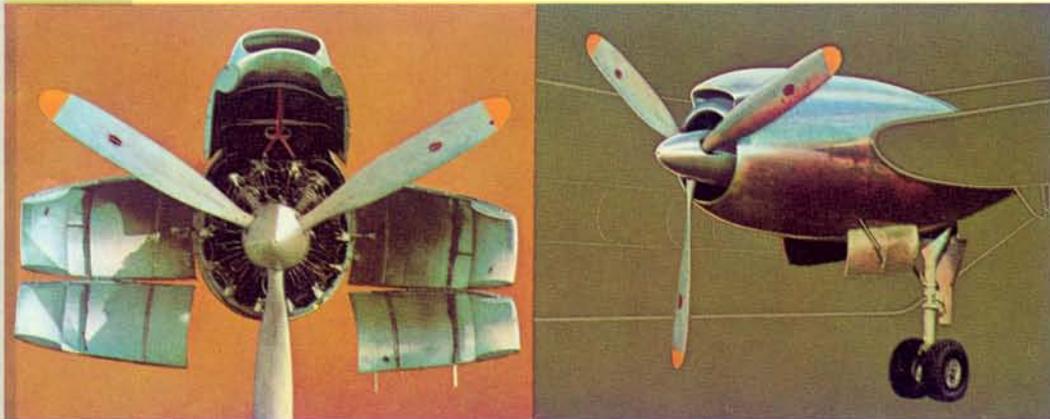
Operating over the world's air routes in many countries, the unmatched servicing and spares facilities which have been established for the R-2000 engines are now available to Caribou operators.

First flown in 1939, in the Douglas DC4, the R-2000 went into mass production during and after the war years to power this popular and highly utilized aircraft. To date the engine has amassed an incalculable number of operating hours and is adding to this already impressive total at the rate of 10,000 operating hours per day in all areas and climates of the world.

The R-2000 has the reputation of being one of the world's most highly developed engines. Engine life between overhauls is now between 1200 and 1800 hours.

The de Havilland design team, with the cost-conscious operator in mind, have mated this highly successful engine to the DHC-4A Caribou airframe. Its ruggedness and reliability under all operating conditions are in keeping with the STOL, rough field, high utilization concept of the Caribou.

*Where a very high single engine ceiling is desired, a two speed blower version of the R-2000 engine is available.

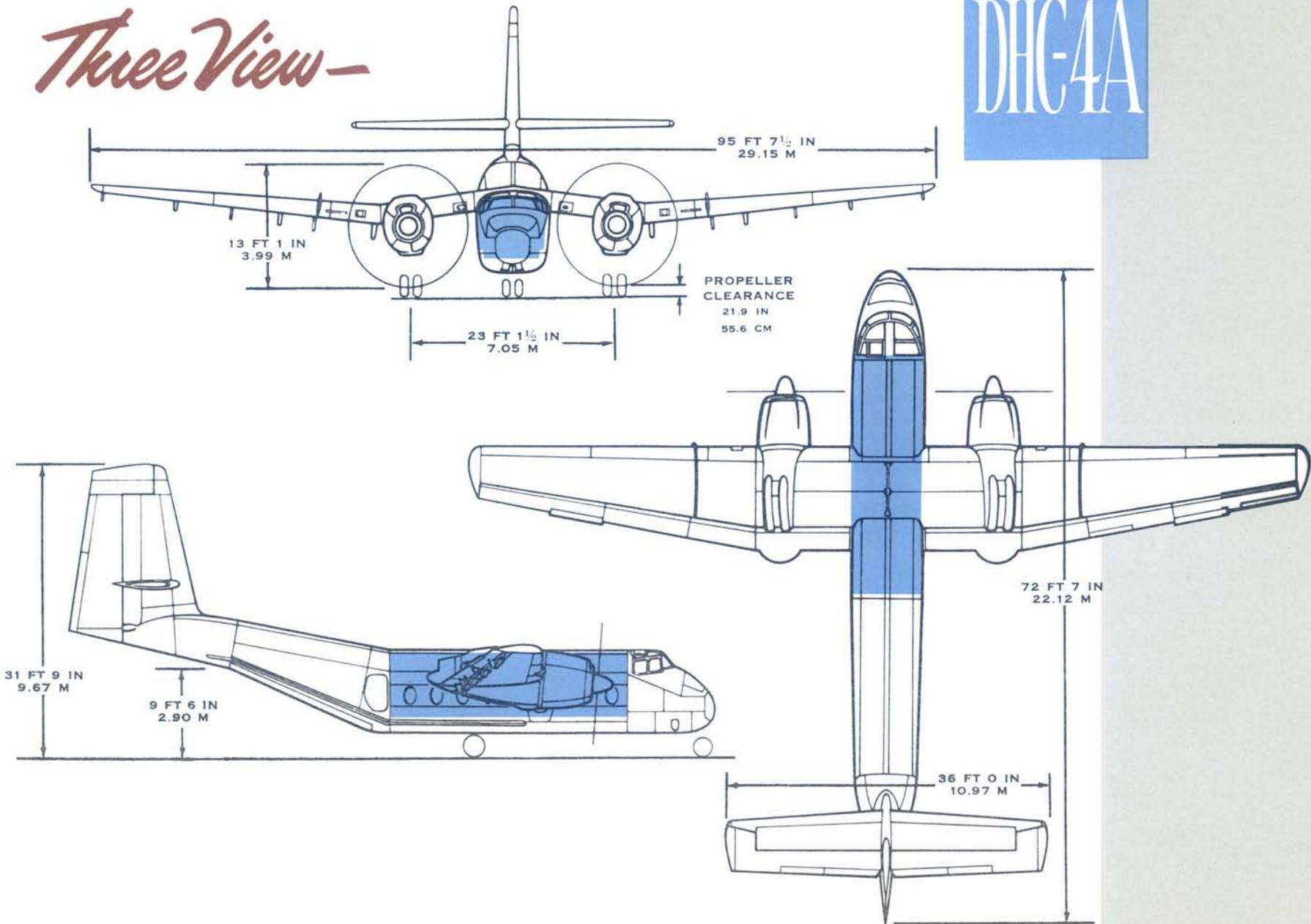


LEFT: Petal type cowlings provide for easy, speedy servicing.

RIGHT: Power plants are identical on either side from firewall forward.

Three View-

DHC-4A



Performance Summary—

The following performance figures are based on flight tests reduced to Standard Day, sea level, zero wind and level surface conditions. For single engine operation, it is assumed that the propeller of the inoperative engine is feathered.

MAXIMUM RANGE at 28,500 lb gross weight _____ 1210 nm _____ 2242 km

PAYLOAD — RANGE (VFR Utility Version) at 28,500 lb gross weight.

Payload for: 200 nm	371 km	_____	8620 lb	_____	3910 kg
400 nm	741 km	_____	7774 lb	_____	3526 kg
600 nm	1112 km	_____	6916 lb	_____	3137 kg
950 nm	1760 km	_____	5417 lb	_____	2457 kg

(Cruise at 7500 ft at 2 x 725 BHP, fuel for take-off, climb, cruise, descent, landing & 45 min. reserve)

SHORT FIELD TECHNIQUE

TAKE-OFF AND LANDING DISTANCES

26,000 lb	28,500 lb
<u>11,794 kg</u>	<u>12,928 kg</u>

Take-off (Both engines at take-off power)

Ground run _____	540 ft 165 m	_____	725 ft 221 m
Total distance to clear 50 ft (15 m) obstacle	_____	1020 ft 311 m	_____
			1185 ft 361 m

Landing

Ground run (dry concrete) _____	525 ft 160 m	_____	670 ft 204 m
Total distance from 50 ft (15 m) obstacle	_____	1020 ft 311 m	_____
			1235 ft 376 m

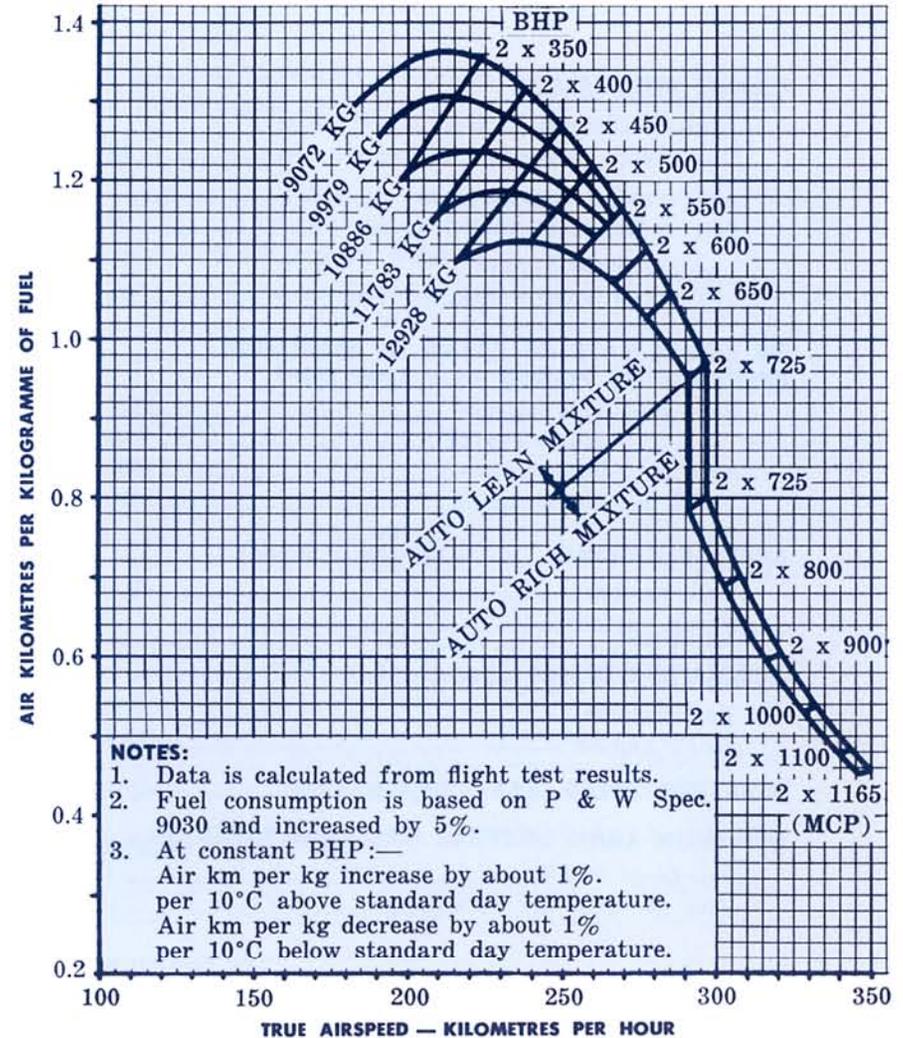
CAR-4B CLIMB GRADIENT AFTER TAKE-OFF (GEAR UP)

Both engines _____	20.1%	_____	18.0%
Single engine _____	3.9%	_____	3.5%

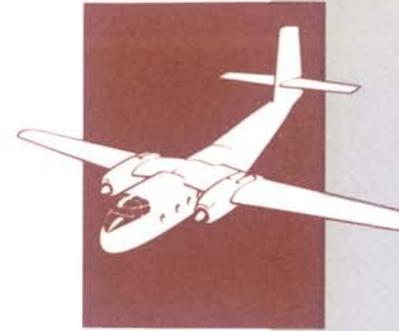


Air KM per KG of Fuel

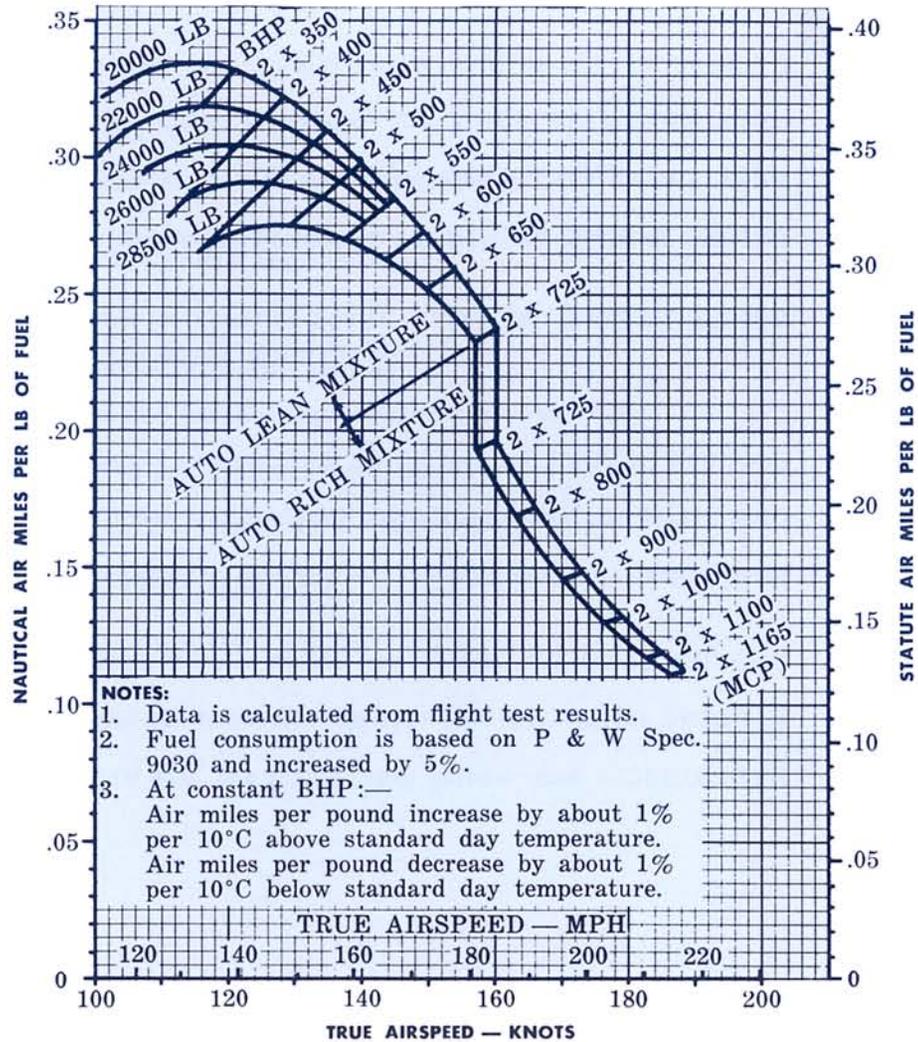
CONDITIONS — FLAPS AND GEAR UP
STANDARD DAY (ISA)
WEIGHT 12,928 KG
ALTITUDE 2286 M



Air Miles per Pound of Fuel



CONDITIONS — FLAPS & GEAR UP
STANDARD DAY (ISA)
WEIGHT 28,500 LB
ALTITUDE 7500 FT



Special Features

a pilot's airplane

- ✓ EXCELLENT ALL-ROUND VISIBILITY — 265° forward vision — 32 sq ft (2.97 sq m) of glass.
- ✓ NOSE WHEEL STEERING — 29 feet turning radius (8.8 m).
- ✓ VERY SHORT TAKE-OFF — unstick in 480 feet (146 m) with 15 kt (28 kph) headwind.
- ✓ SINGLE ENGINE SAFETY — climb out on one engine with take-off flap, landing gear up.
— 295 feet per minute (1.5 m/sec).
- ✓ SINGLE ENGINE CEILING — At 90% of max gross weight the service ceiling is 11,800 ft (3597 m).
An absolute ceiling of 14,200 ft (4328 m) with one engine, makes possible safe operation anywhere in the world.
- ✓ COCKPIT LAYOUT features airline duplication of instruments.
- ✓ ONE PILOT can handle the Caribou for short haul operation.
- ✓ LOW APPROACH SPEEDS — 77 kt (88 mph 142 kph) on final — excellent for instrument landings.
- ✓ RUGGED LANDING GEAR — can absorb 13 feet per second descent (3.96 m/sec).
- ✓ LANDING ROLL — 460 feet (140 m) with 15 kt (28 kph) headwind.
- ✓ HYDRAULIC — flaps, landing gear, brakes and nose wheel steering.



Special Features

an engineer's airplane

- ✓ POWER PLANTS — each side identical from firewall forward.
- ✓ COWLINGS — petal type — for easy, speedy servicing.
- ✓ MAIN SHOCK STRUTS — two stage principle — same both sides.
- ✓ FUEL CELLS — 10 each outer wing — individual access panels — one filler each side.
- ✓ CONTROL SYSTEMS — primary controls all mechanical.
- ✓ WIRING — plug and connector joints widely used.
- ✓ ACCESS AND INSPECTION PANELS provided in all components for servicing.
- ✓ ACCURATE TOOLING — ensures fit of replacement components.
- ✓ CABIN FLOOR — truck bed height — 45 inches to ground (114 cm).
- ✓ HYDRAULICS—3000 psi system (210.9 kg/sq cm).
- ✓ DUAL WHEELS — all around. Nose and Main Wheels 40 psi nominal (2.8 kg/sq cm).

The logo for the DHC-4A aircraft, featuring the text "DHC-4A" in a white, serif font on a blue rectangular background. The logo is positioned in the upper right quadrant of the slide, partially overlapping a vertical grey bar that runs down the right edge of the page.

DHC-4A

Special Features ✓

a loading crew's airplane

✓ FLOOR STABILITY

As a design feature the Caribou main and nose shock struts have two stages. This gives a very small deflection from the normal ground attitude and a near level cabin floor during loading and unloading. Uncomfortable pitching movement during taxiing and braking is reduced by this feature.

This short stroke feature does not interfere with the long stroke characteristic required for high energy absorption during short, rough field landings.

✓ RAPID, PASSENGER - CARGO CONFIGURATION CHANGE

Transition from the 30 folding seat passenger version, to the cargo carrying version and back again can be accomplished in a matter of minutes by one man.

✓ OVERHEAD MONORAIL

Structural provision has been made for installation of an overhead cabin monorail, capable of taking a load of 2,000 lb (907 kg) to facilitate manhandling heavy loads along the cabin length.

Structural provision has also been made in the forward cabin for a winch to be used in conjunction with the monorail.

✓ SEPARATE CREW ENTRANCE

Permits loading cabin to capacity with cargo.

✓ REAR LOADING DOORS

Full floor width, 73.5 in. wide x 75 in. high (186.7 x 190.5 cm).



Troop Seating-



Inward facing troop seats, along the side walls, which fold compactly against the walls when not in use, provide comfortable seating accommodation for 32 troops at 20 in. pitch (50.8 cm), or 26 paratroopers at 25 in. pitch (63.5 cm).

The rear door permits troops to be disembarked in a minimum of time and may be opened in flight to allow paratroopers to be dropped from the air.

The Caribou can be converted to an air ambulance to accommodate 22 standard army litters and 4 seats for attendants or sit-up cases. Hospital equipment can be added in combination with various arrangements of seats and litters.



Weight Summary -

The basic weight of the standard specification aircraft (as per price list) is 17,630 lb (7997 kg). This is common to all DHC-4A aircraft and includes essential structure, services, trapped fuel and oil; it also includes all equipment, except radio, mandatory for Type Approval.

To assist in calculating payload, two operational weights of typical utility passenger/cargo type aircraft are shown below.

Typical Utility Aircraft (VFR Flight)

Standard Basic Weight _____	17,630 lb	_____	7,997 kg
Radio Equipment _____	140	_____	64
Crew (2) _____	340	_____	154
Full Oil _____	270	_____	122
	<hr/>		<hr/>
	18,380 lb	VFR Operational Weight	8337 kg

Typical Utility Aircraft (IFR Flight)

Standard Basic Weight _____	17,630 lb	_____	7997 kg
Radio Equipment _____	273	_____	124
Additional Cabin Furnishings _____	123	_____	56
Cabin Heating _____	91	_____	41
De-icing (wings, tail and propellers) _____	292	_____	133
Crew (2) _____	340	_____	154
Full Oil _____	270	_____	122
Full De-icing Fluid _____	111	_____	50
	<hr/>		<hr/>
	19,130 lb	IFR Operational Weight	8677 kg



Payload Range Chart-



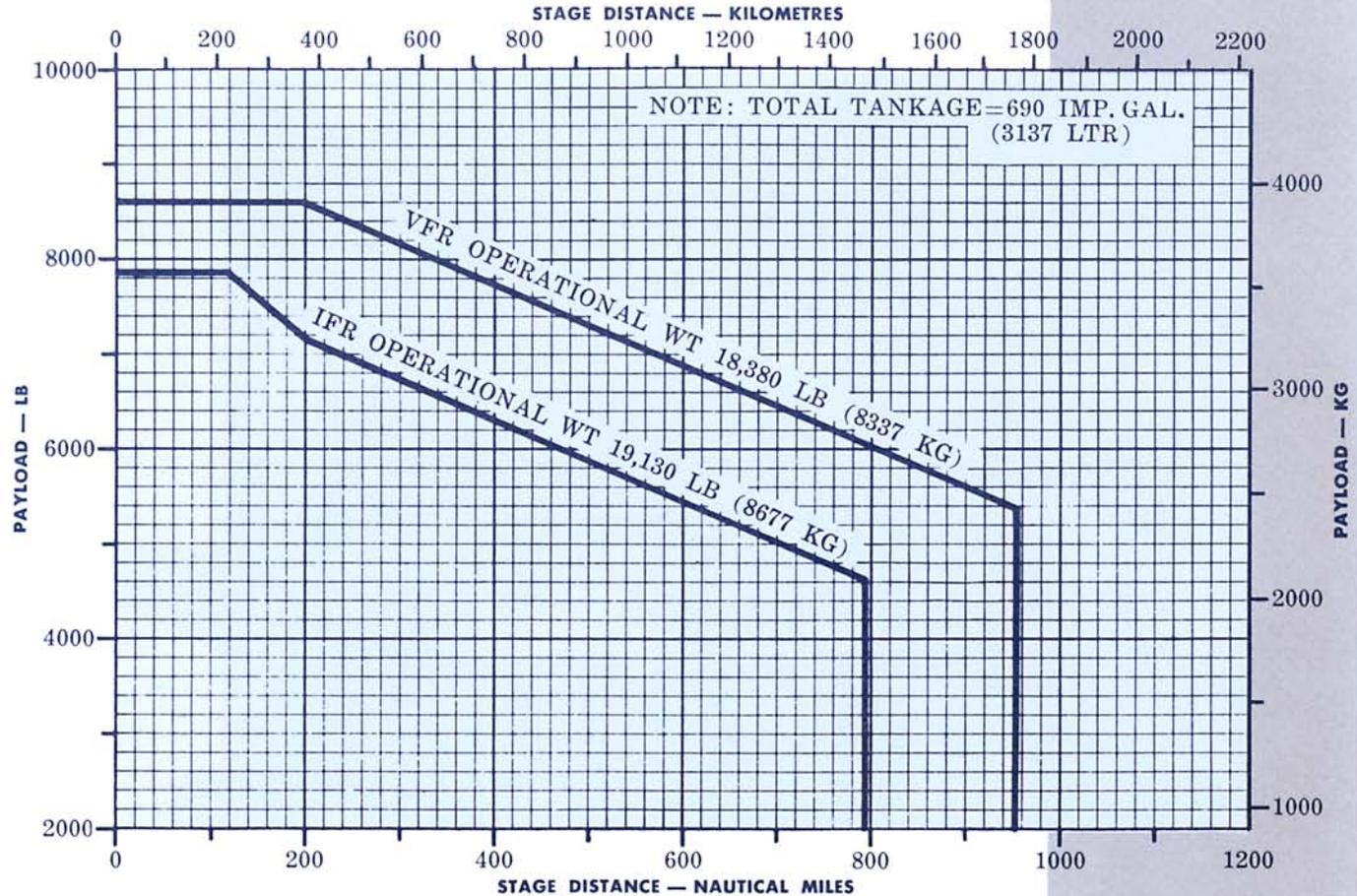
GROSS WEIGHT 28,500 POUNDS
 (12,928 kg)
 STANDARD DAY, ZERO WIND
 CRUISE SPEED (TAS) 157 kt
 (291 kph)
 CRUISE POWER 2 x 725 BHP
 CRUISE ALTITUDE 7500 FT
 (2286 m)

FUEL ALLOWANCES FOR:

Take-off, Climb, Cruise,
 Descent, Final Circuit and
 Landing

FUEL RESERVE FOR:

1. VFR: 45 minutes at cruise power, 2 x 725 BHP
2. IFR: the lesser of stage distance or 200 nm at cruise power, 2 x 725 BHP. Plus: 45 minutes holding at 2 x 450 BHP.



The Cockpit



The nerve centre of the Caribou — the cockpit — is comprehensively equipped, but remains simple and functional. A main consideration is crew comfort and freedom of movement. All operational controls are within easy reach.

The engine controls are overhead for maximum pilot convenience and effective utilization of space.

An interesting feature is the radio console which slides forward on runners when not in use.

The nose wheel steering wheel is conveniently located on the port cockpit wall.

All-round visibility is exceptionally good. The cockpit glass area totals 32 square feet (2.97 sq m) an increase of 400% over the average transport aircraft. The pilot's arc of vision is 265° from wing tip to wing tip and 183° from nose to tail, an advantage of increasing importance in high-density traffic areas.

The windshield is bird-proof for safety and is electrically heated for de-icing and de-misting.

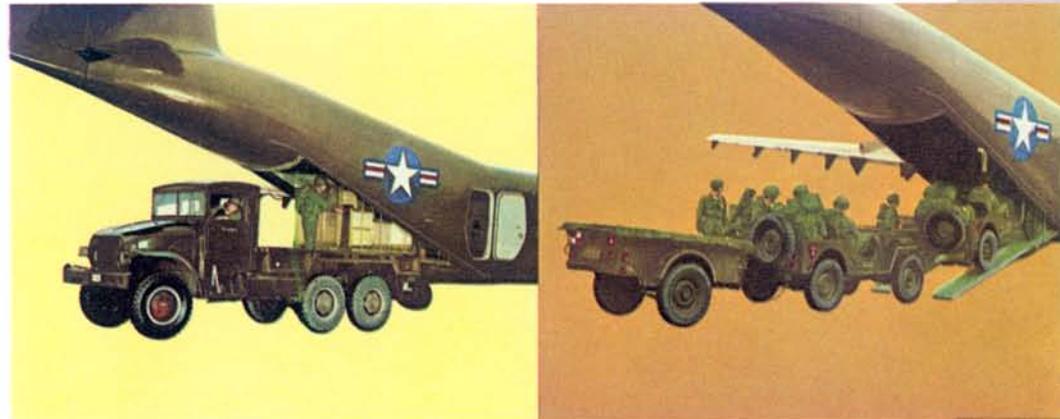
For short field operation, the excellent forward and side vision allows minimum clearance between aircraft and approach obstacles.

Jeep and Truck Loading-

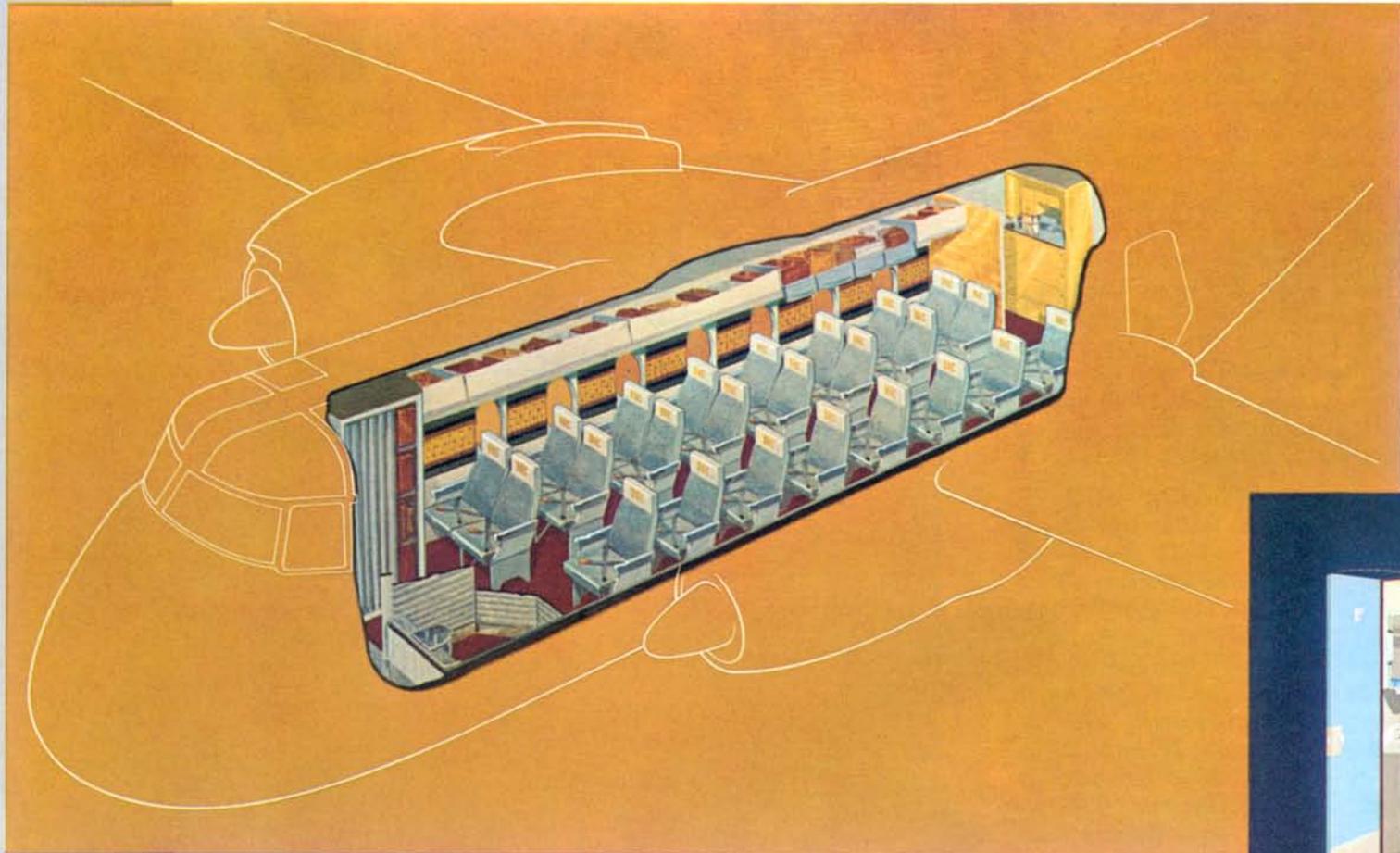
DHC-4A

Quick loading and turn-around time are primary considerations. The rear loading doors, approximately 38.2 sq ft (3.5 sq m) in area, are built in two parts. The upper portion retracts into the tail roof structure, permitting a 3-ton truck to back into the opening. The lower section acts as a ramp, which can be adjusted to match truck bed heights. Cargo can then be quickly rolled into the cabin on roller conveyors. Alternatively, provision has been made for a monorail in the roof of the cabin. While separate passenger side loading doors are provided, the wide rear loading doors ensure a very rapid means of loading and unloading troops.

The angle of the loading ramp can be adjusted. With portable ramp extensions, motor cars, tractors, jeeps and wheeled vehicles can be driven in and out under their own power, or heavy objects can be skidded in and out with the assistance of a winch.



Deluxe Seating -





The spacious cabin lends itself to a variety of interior arrangements in the deluxe airline and executive aircraft category. These interiors are furnished to individual customer requirements. The sketches illustrate some of the attractive possible arrangements.

The first class feeder line interior illustrated in the cut-away drawing (left) is based on 24 airline passenger seats arranged in pairs and singles on either side of the wide aisle.

This suggested arrangement includes overhead luggage racks, baggage compartment, toilet, buffet, window curtains and cabin attendant's seat.

Large oval shaped windows are 16 in. wide by 21 in. high (40.6 x 53.3 cm).

The overhead luggage racks are 25 in. wide by 12 in. deep (63.5 x 30.5 cm) and are hinged to stow in the up-position.

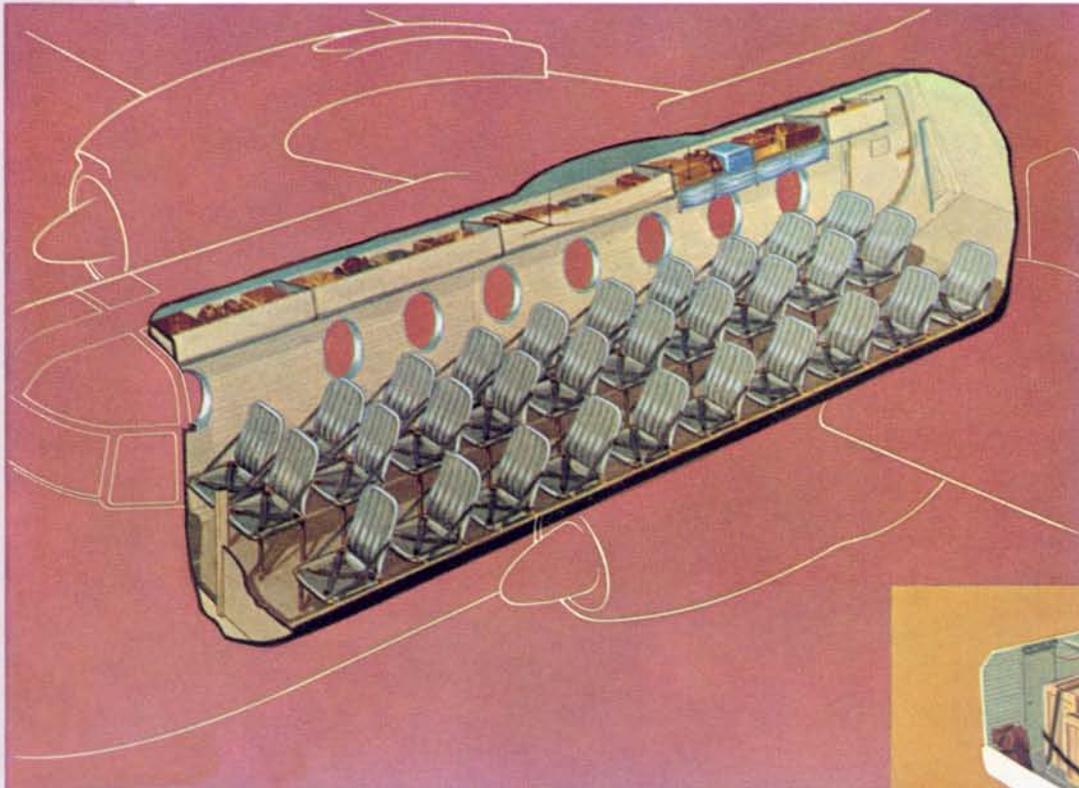
Passenger reading lights are installed in the luggage racks.

The baggage compartment is 33 in. wide by 29 in. deep by 74.5 in. high (83.8 x 73.7 x 189.2 cm) and has 3 adjustable racks with a sliding curtain. Alternatively, a larger compartment 48 in. wide (121.9 cm) can be installed, which accommodates coat racks as well.

Passenger seats illustrated are foam rubber cushioned and contain fold-away tables, pockets and ash trays in the arm rests.

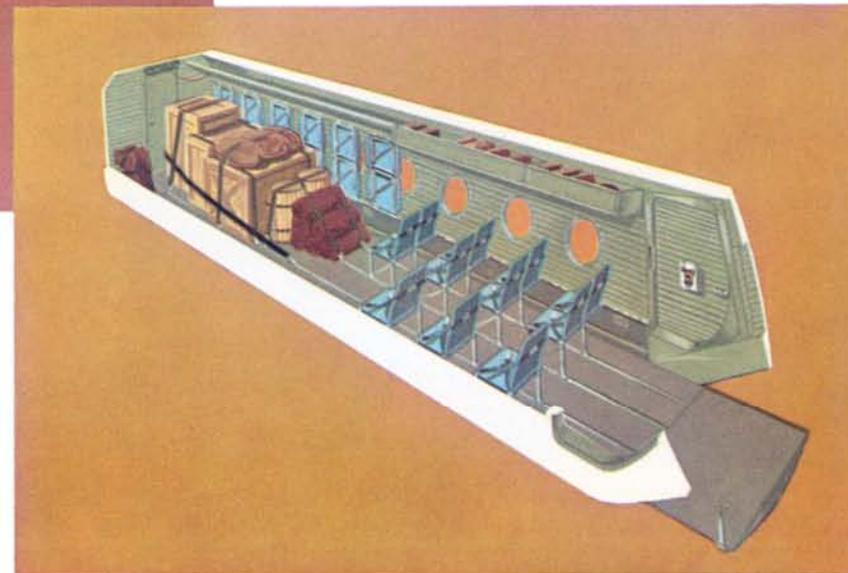


Utility Seating -



The 30 passenger seats are utility type and fold against the walls when cabin space is required for cargo. They are especially light in weight (9 lb per seat) so that their removal is not a necessity. Transition from passenger to cargo configuration and back again can be made in a matter of minutes by one man. Provision is made for quickly removable cargo tie-down rings in the floor and side walls. Any combination of cargo and/or passenger seating is possible.

The cabin floor is constructed of aluminum-alloy honeycomb and may be covered with an overlay of removable plywood panels for additional protection.



Low Operating Cost-



The straight-forward all-metal construction of the Caribou airframe has been purposely designed to offer rigorous economy in maintenance and servicing costs.

Proven, dependable Pratt and Whitney R2000-7M2 engines assure the operator of minimum power plant maintenance costs — comparable to those of any existing utility type aircraft.

Short take-off and landing ability, good ground handling characteristics, the large rear loading doors, and many other time saving loading features have been incorporated into the design of the DHC-4A to guarantee quick turn-around time — an important factor in reducing operating costs.

Direct costs as low as 18 cents per ton nautical mile, or 2.3 cents per passenger nautical mile, can be achieved.

The Caribou will carry a substantial payload and has the ability to move it in and out of small fields hitherto inaccessible to large multi-engine transport aircraft. This will enable the operator to tap new sources of revenue, with consequent increased traffic-dollar volume per hour of aircraft utilization.

While the Caribou is a STOL aircraft designed to operate from VERY SHORT unpaved runways, 1200 feet (365 metres) in length, it is capable of carrying greater payloads from ordinary runways, 2500 feet (765 metres) or more in length.

A "PERFORMANCE SUMMARY" containing detailed technical performance and weight data is now available and will gladly be furnished, together with other technical data, upon request. A cost study "DIRECT OPERATING COSTS, DHC-4 STOL TRANSPORT", containing a complete analysis of direct operating costs, is also available upon request. In addition, we will be pleased to prepare an analysis of the Caribou's application to any particular routes. Please communicate with the writer at the address shown below.

SALES DIRECTOR
THE DE HAVILLAND AIRCRAFT OF CANADA LTD
DOWNSVIEW, ONTARIO

Short Airstrip Performance—



SHORT IMPROVISED AIRSTRIP PERFORMANCE

The Caribou's most outstanding attribute is its STOL ability to move three-ton loads in and out of landing strips heretofore accessible only to light airplanes.

The landing strip at Fort Benning, Georgia (left), is 1100 feet (335 m) long. The photo was taken from the cockpit window as the Caribou was touching down with a 5 knot wind. The aircraft finished its landing roll 150 feet short of the dark spot in the centre of the picture — by actual measurement in a distance of less than 300 feet (91 m).

Desert Operation—

DHC-4A

The photographs on this page were made at Mansour, a desert sand area located on Bahrein Island in the Persian Gulf. The penetration of the nose wheels (left) and the depth of the ruts in the right hand photo provide graphic proof of the soft surface conditions encountered. No difficulty of any kind was experienced in making take-offs and landings, nor was any difficulty encountered in turning the aircraft in the softest sand or taxiing back and forth across the ruts produced by the previous Caribou landings.



STOL OPERATION OFF DESERT SAND

STOL Performance—

Time: Midwinter 1961. Place: Resolution Island, above Lat. 60°N. Operation: 25,000 lb. of U.S.A.F. high priority freight to airlift from Frobisher. Round trip distance, 390 miles. Carrier: Nordair Limited.

Landing Strip: Length, 1300 feet. Width, not over 100 feet for half its length — walled in by banks of snow-covered rock 10 feet high. Runway Extensions: None. Sheer drop 800 feet, east end. Fall-off 300 feet, west end.

Facilities: Strictly VFR.

Cross Wind: 25 kt., gusting to 30 kt., 60 to 90 degrees to the strip 70% of the time.

Turbulence: Severe. Average Temperature: 24° below zero.

Operation Summary: MISSION ACCOMPLISHED.

The Caribou unloading at Resolution Island airstrip, which lies contained throughout its entire length within the circle (upper photo). Wheeler Airlines' Otter (background) uses the strip regularly.





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