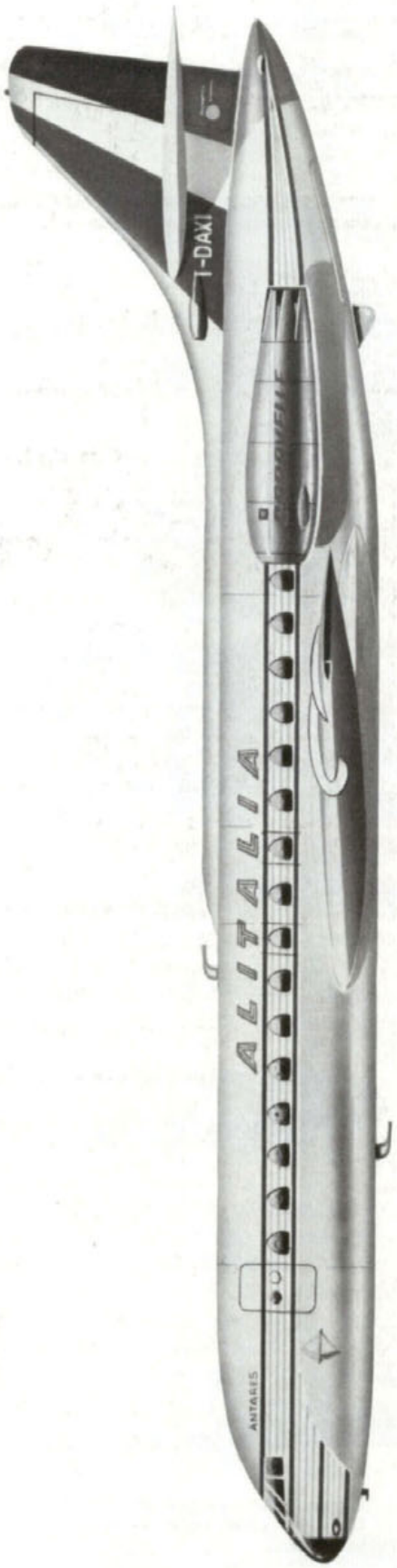
PROFILE PUBLICATIONS

The Sud Caravelle 3 & 6



NUMBER 180

Comte de Foix

Caravelle III, SE210-83, F-BKGZ "Comte de Foix" of Air France. Originally registered as F-BJTC ("Bourbonnais"), the machine was leased to Air Liban as OD-ADY.

Insignia of Air France.

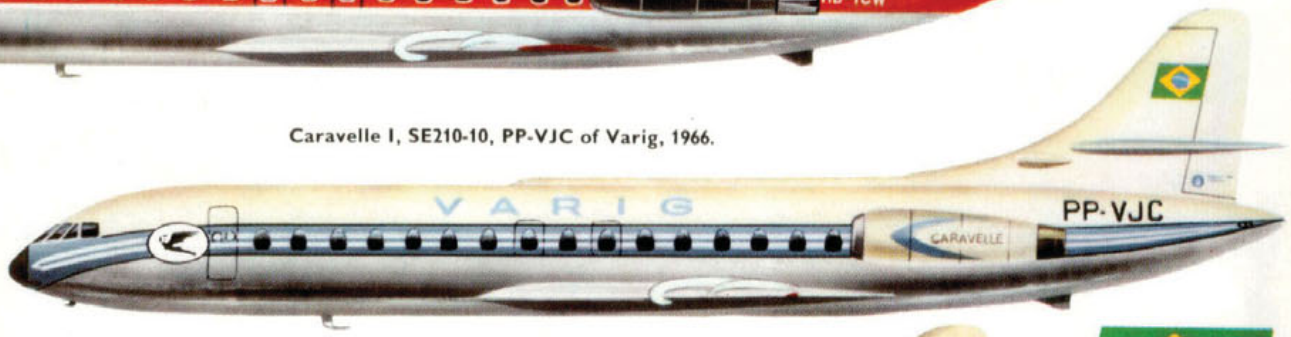
Caravelle IA, SE210-33, HB-ICW "Solothurn" of Swissair. Originally built for SAS, the aircraft was leased to Swissair in 1965.

Shield of Solothurn, nose marking.

SWISSAIR

Insignia of Swissair.

Caravelle I, SE210-10, PP-VJC of Varig, 1966.



Insignia of Varig.

Caravelle VI-R, SE210-138, EC-AXU "Alfonso X. el Sabio" of Iberia; 1967. Aircraft originally built as N210G for the Garrett Corporation.

ORDEM E PROGRESSO

Brazilian national flag, on tail.

Insignia of Iberia.

Caravelle III, SE210-217, F-BNKC of Air Inter, 1967. One of last three Caravelles for this operator; other two machines were SE210-220 F-BNKD and SE210-224 F-BNKE.

Wein

Caravelle VI-R, SE210-161 "Wein" of Austrian Airlines, 1964.

INNSBRUCK 1964

Special Olympic shield carried by Austrian Airlines machines.

Caravelle VI-R prototype, SE210-62, F-WJAP, in the colours of United Air Lines. This Caravelle was sold to Cruzeiro de Sol.

UNITED AIR LINES

Shield of United Air Lines.

The Sud Caravelle 3 & 6

by Kenneth G. Munson

The remarkable cleanness of the Caravelle's design is well demonstrated by this excellent photograph. (Photo: Air France)

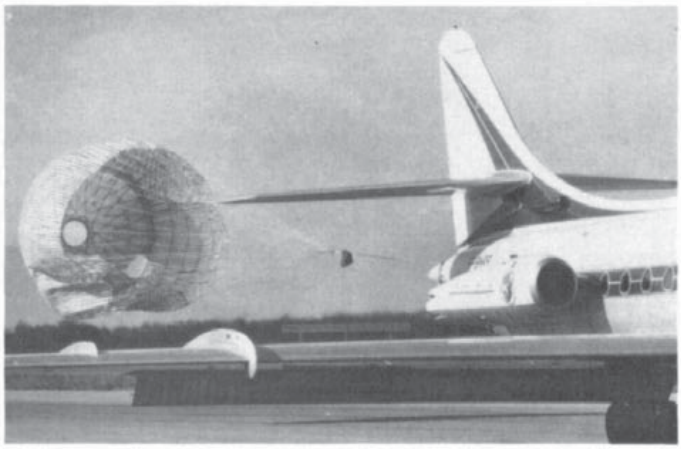
Probably the most well-worn of all aviation clichés is the one which declares that, if an aeroplane looks right, then it *is* right. This sentiment, admirable though it may be, has unfortunately not always been borne out in practice, but there will be few—and not one of them a Frenchman—who will deny that it applies well and truly to the Sud-Aviation Caravelle, one of the most aesthetically appealing aeroplanes ever to leave a drawing board. Moreover, this aeroplane's looks are matched by an equally happy choice of name, for the caravels of the 15th and 16th centuries were among the most attractive and successful merchant vessels of their time.

A convenient starting point for the Caravelle story is 12th October 1951, on which date the *Comité du Matériel Civil*, a body of government and airline representatives appointed by the *Secrétariat-Général à l'Aviation Civile et Commerciale*, gave the French aviation industry its first positive indication of official interest in the evolution of a nationally designed and built turbine-powered airliner. Design studies for aircraft in this category had been undertaken since 1946 by several of the leading French aircraft manufacturing organisations, but for financial reasons none of these had reached the stage of actual construction. Most of the proposals favoured a pure-jet formula, although Breguet had drawn up, under the collective designation Br. 978, projects for both turbojet and turboprop types; among these was one for an Atar-powered tri-jet to be developed in association with the SNCA du Nord. At Hurel-Dubois, designs were considered using a fuselage and high-mounted narrow wing basically similar to those which appeared later in the H.D.31 and H.D.32. Proposals from the SNCA du Sud-Ouest included the S.O.60, employing two Rolls-Royce Avon R.A.7 engines as the main installation, augmented by two smaller Turboméca Marborés as auxiliaries. At the SNCA du Sud-Est, the design team under Pierre Satre evolved a number of designs under the group designation X-200 to X-210; and it was one of the X-210 projects, employing a trio of SNECMA Atar engines, that was ultimately to form the basis for the Caravelle.

The formal specification issued on 6th November 1951 by the *Direction Technique et Industrielle* called for an aircraft capable of flying stage lengths of up to 2,000 km. (1,243 miles) at block speeds in excess of 600 km./h. (373 m.p.h.) with 55-65 passengers and 1,000 kg. (2,205 lb.) of freight or baggage, a total

The 01 prototype, bearing a mixed Sud-Aviation/Air France livery for demonstration purposes.
(Photo: Secrétariat d'Etat à l'Air)

This nocturnal view of the prototype 02 shows the extreme simplicity of the original R.A.26 engine pods.
(Photo: Air France)



Air France acceptance trials at Bastia included landings with the aid of a tail-braking parachute. The aircraft depicted is F-BHRB (*c/n. 2*). (Photo Air France)

payload of some 6-7 tonnes. Significantly, it specified neither the number nor the type of turbine engines to be employed in the design. During the next few months a strong inclination grew up in the industry in favour of a twin-jet formula, but at that time French civil jet engine development was still in its infancy. The most powerful domestic jet engine available was the military Atar, but at the current rating of only 2,800 kgp. (6,170 lb.s.t.) it was clear that two Atars alone would not provide sufficient thrust to achieve the required performance; a suitable powerplant would have to be sought elsewhere.

The handing over ceremony at Toulouse for the first Scandinavian Airlines System Caravelle I, LN-KLH (*c/n. 3*).
(Photo: Sud-Aviation)

Accordingly, in a progress report issued on 28th March 1952, the *Comité du Matériel Civil* reduced the contending designs to a short list of three: the four-engined Avon/Marboré S.O.60, the twin-Avon Hurel-Dubois project, and the Sud-Est X-210. Enquiries having revealed that Rolls-Royce could now promise a developed Avon, the R.A.16, to deliver more than 9,000 lb. of thrust, the *Comité* requested the SNCASE to re-submit the X-210 as a twin-Avon design for comparison with the other two finalists.

The X-210's origination as a three-engined design, which had necessitated the installation of the third engine along the centre-line, had clearly indicated the rear of the fuselage as the ideal location for the entire powerplant, and the advantages of such a layout were such that the SNCASE saw no reason to alter this basic configuration when re-vamping the design to take a pair of Avon engines. These advantages have been discussed elsewhere, frequently and at great length, and have since been adopted by more than a score of other designs the world over. The major aerodynamic benefits are twofold: that longitudinal stability is affected little by changes of thrust, and that the fullest efficiency can be extracted from a completely unhampered wing. The engine pods themselves are interchangeable and more accessible for servicing; their location at the rear of the aircraft improves intake efficiency, and fire risk is substantially reduced because they are physically far removed from the fuel tanks. Finally—and this has been an important ingredient in the Caravelle's sustained passenger appeal—the cabin noise level is much lower than it would be if the engines were mounted on the wing.

The revised X-210 design with twin Avons was re-submitted to the SGACC in July 1952, and only two months later the SNCASE received official notification that its design had been accepted. In February 1953 work commenced on the construction of two flying prototypes, one airframe for fatigue testing and another for static tests, the order for which was confirmed by the SGACC on 2nd July 1953. The aeroplane now abandoned its 'X' status and became the S.E.210.

For 20 months, work on the completion of the prototypes continued at Toulouse. A 350,000 cu. ft. fatigue tank was specially built by the Etablissement Aéronautique de Toulouse to test the Caravelle airframe to destruction. The extensive application of 'fail-safe' principles was a prominent feature of the Caravelle's design, a factor more than usually desirable in an aeroplane intended for intensive operation on high frequency schedules over short and medium stage lengths. Air France attached technical and flight personnel to assist the Sud-Est team, and a substantial measure of co-operation was also given by the British aircraft industry, notably by Rolls-Royce and de Havilland. The latter company made available much data arising from its own experiences in designing and flying the Comet 1, one result of which is that the Caravelle has an identical nose section and a very similar flight deck layout to the British airliner.

On 21st April 1955 the first flying prototype, *F-WHHH* (c/n. 01), was rolled out to begin ground running and taxiing trials. The maiden flight, lasting 41 minutes, was made on 27th May with Pierre Nadot, senior test pilot of SNCASE, at the controls, André Moynet as co-pilot, Jean Avril as navigator and Roger Beteille as flight engineer. Within the next eleven months, *F-WHHH* had flown 411 hours in 173

The first Caravelle sold to a non-European customer was c/n. 10 to Varig. (Photo: Sud-Aviation)

flights to complete its certification programme before being handed over to Air France crews for proving trials at the beginning of May 1956. (The French flag carrier had placed an order on 3rd February 1956 for 12 aircraft, with options on a further 12.) One landmark in the proving programme comprised two return flights between Orly and Casablanca on 28th August, all four trips being flown on a single engine. The second prototype, *F-WHHI* (c/n. 02), had meanwhile made its maiden flight on 6th May 1956, flown by Nadot with Léopold Galy as co-pilot. Both prototypes were powered by 10,000 lb.s.t. (4,536 kgp.) Avon R.A.26 engines.

The Caravelle I, with Avon 522 turbojets and a fractionally longer nose than the prototypes (to house a weather radar installation), entered production late in 1956. On 1st March 1957 the Sud-Est and Sud-Ouest concerns amalgamated to form Sud-Aviation, but so far as the Caravelle was concerned the S.E. designation was retained. French certification of the Caravelle I was granted on 2nd April 1959*, which date also marked the handing over of c/n. 1 (*F-BHRA*) to Air France, although the first actual delivery had taken place a fortnight earlier, on 19th March, with *F-BHRB* (c/n. 2). The third Caravelle I, *LN-KLH*, delivered on 10th April, was the first for Scandinavian Airlines System, which had ordered six (with options on another 19) on 28th June 1957. Of the first nine Caravelle I's, five went to Air France and the other four to S.A.S.; the tenth aircraft was completed for the Brazilian operator Varig as *PP-VJC*, the first of two ordered on 16th October 1957, and was delivered on 16th September 1959. The Brazilian order had been placed after the second prototype Caravelle had completed a 31,000-mile sales demonstration tour of North and South America between 18th April and 25th June 1957. Only three days after returning to Toulouse after this exhaustive tour, and coinciding with the signing of the contract with S.A.S., *F-BHHI* left again to show its paces in Scandinavia.

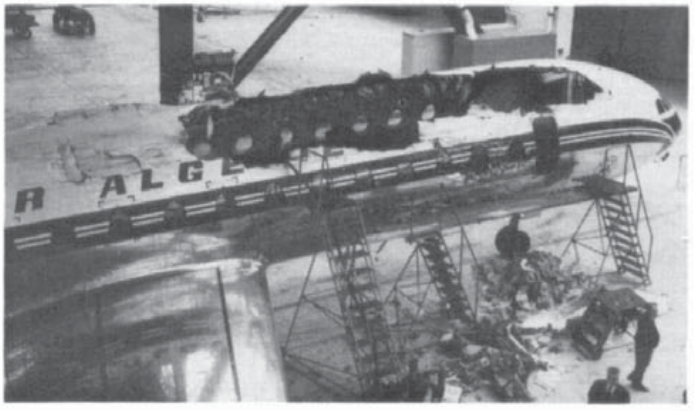
In fact, the Scandinavian airline had the distinction of becoming the first operator to put the Caravelle into regular route service. The 02 was hired from Sud-Aviation to initiate a training programme which started on 1st March 1959, and on 26th April the first S.A.S. Caravelle services, to the Middle East, were inaugurated. Air France was quick to follow suit, introducing its Caravelles on the Paris-Istanbul route on 6th May; and the granting of F.A.A. type approval on 8th April opened the way for Varig to commence the first American services with the aircraft on 7th December 1959.

Production of the Caravelle I ceased with c/n. 20, the nineteenth aircraft having been reserved as prototype for the Series III (and, later, the Series VI). Its place was taken on the production line by the Caravelle IA, powered by Avon 522A (526) engines of similar power but otherwise virtually identical in appearance and performance to the initial model. The first Caravelle IA, c/n. 21, was *OH-LEA*, the first of three for Finnair, delivered on 18th February 1960 and entering service on the Helsinki-Stockholm route on 1st April.

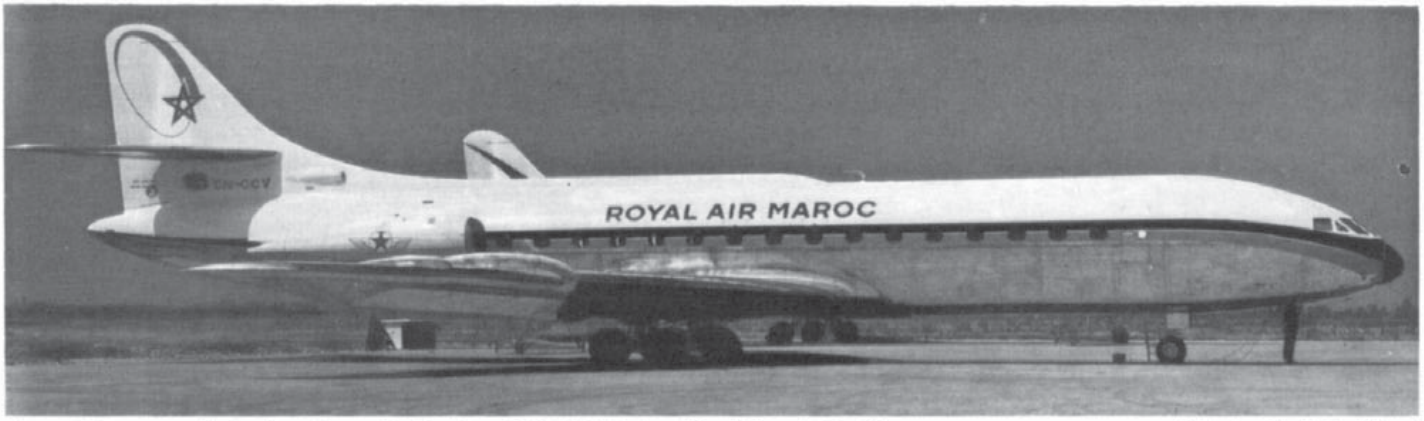
The first major development of the Caravelle was the Series III, so designated because it was powered by the third-stage development of the civil R.A.29

The first Caravelle IA, c/n. 21, seen bearing temporary French registration F-WJAK *before delivery to Finnair as* OH-LEA Sinilintu. (Photo: Sud-Aviation)

Caravelle IA of Air Algérie undergoing repair after a collision with a Stampe biplane over Orly in 1960.
(Photo: Sud-Aviation)



French civil aircraft are normally allotted registrations commencing F-W *until they have completed certification trials. Thereafter, in most cases, the letter* B *replaces the* W: *thus,* F-WHHH *became* F-BHHH *after 2.4.59.*



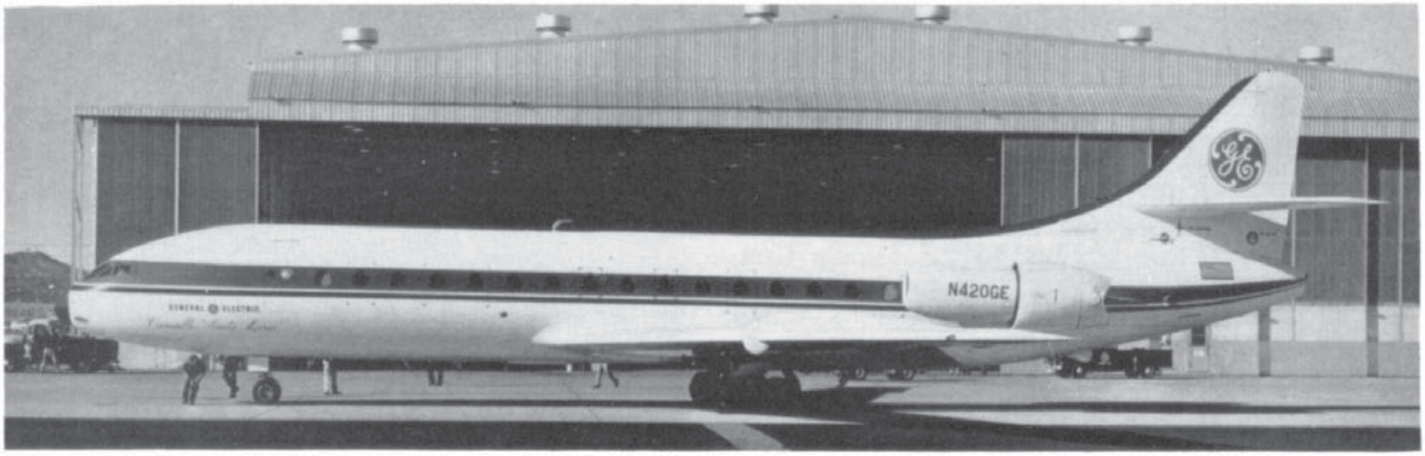
One of the more distinctive Caravelle liveries: CN-CCV *(c/n. 32) of Royal Air Maroc.* (Photo: Sud-Aviation)

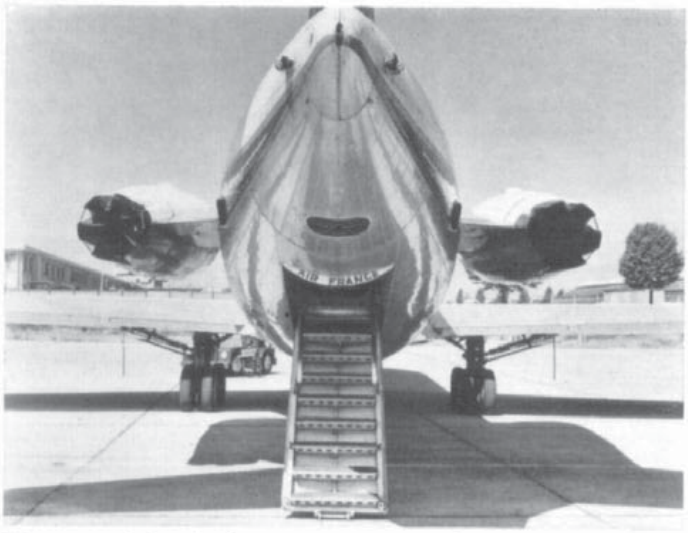
HB-ICX Chur, *a Caravelle IA/III leased by Swissair from S.A.S., taking off from London Heath Row.*
(Photo: Alasdair Macdonald)

Avon, the 11,400 lb.s.t. Mk. 527. Completed as the Series III prototype, *F-WJAQ*, c/n. 19 flew for the first time on 30th December 1959. The first production Caravelle III was c/n. 33, but the first actual delivery was made on 29th April 1960 with c/n. 35 *I-DAXA*, first of 14 aircraft ordered by Alitalia, who put the type into service Rome-London on 23rd May. This and three other Alitalia Caravelle III's were later converted into Series VI-N's, and with a total of 21 of the latter version the Italian carrier now has the second largest Caravelle fleet in current operation. All Caravelle I/IA's (except c/n. 14) were converted during 1960-61 to Series III standard, and the Series III remains in production alongside the later variants. One Series III aircraft, c/n. 42, was delivered to General Electric on 25th July 1960 and re-engined with 16,100 lb.s.t. CJ805-23C turbofans as *N420GE Santa Maria*, prototype for a proposed Caravelle VII. In its re-engined form this aircraft flew for the first time on 29th December 1960. Four aircraft (c/ns. 128, 130, 132 and 134) were begun as Series VII's, and in September 1961 T.W.A. ordered twenty of this version; but this order was subsequently cancelled in favour of the DC-9 and the four aircraft mentioned were eventually completed as Series VI-N's.

By the end of 1960, one hundred and five Caravelles of all kinds had been ordered by an ever increasing list of airlines in almost every part of the world. This was still little more than half-way to the estimated break-even sales figure, but still represented an immensely encouraging response both for Sud-Aviation and for the French aviation industry as a whole. Apart from the Caravelle's handsome lines and undoubted passenger appeal, it was the first short-haul jet on the market and its performance was economically attractive. As the order list continued to grow, an increasing number of customers began to demand the Caravelle Series VI, which from 1961 became the major production model. With a marked boost in performance brought about by the employ-

The first fan-engined Caravelle (c/n. 42) shown (above right) *in original Series III form as* F-WJAM, *and* (below) *after re-registration as* N420GE *and re-engining with CJ805-23C's by General Electric.* (Photos: Sud-Aviation)





Close-ups: (above) *the rear air stairs of a Caravelle III and* (below) *the Caravelle's main landing gear.* (Photos: Air France)

ment of still more powerful Avons, this was available in Series VI-N form with noise-suppressed Avon 531's, or as the Series VI-R with reverse-thrust Avon 533's. Prototype for the series VI-N was c/n. 19, *F-WJAQ*, re-flown in its new form on 10th September 1960. A separate prototype for the VI-R, c/n. 62 *F-WJAP*, was flown on 6th February 1961.

The first and major customer for the Series VI-R was United Air Lines, which had ordered a fleet of 20 of this version on 25th February 1960. This represented the largest single order so far placed for any Caravelle variant, and was the more noteworthy for having come from a U.S. operator. More than two hundred refinements were embodied in the Caravelle VI-R in order to conform to American civil aviation requirements. Most of these were detail changes; outwardly, the chief visible modifications were the bulged roof over the crew cabin, a modified windscreen of greater area, and triple-section spoilers on each wing trailing edge. Both versions of the Caravelle VI have the main structures and landing gear reinforced in order to reap full benefit from the extra thrust of their higher-powered Avon engines. The first production Series VI-N (c/n. 64 *OO-SRA*) was delivered to Sabena on 20th January 1961, two days after the first VI-R (c/n. 86 *N1001U*) was accepted by U.A.L. Services were started respectively by Sabena (Brussels-Nice) on 18th February 1961, and by United (following F.A.A. type approval of the Series VI-R on 5th June) between New York and Chicago on 14th July.

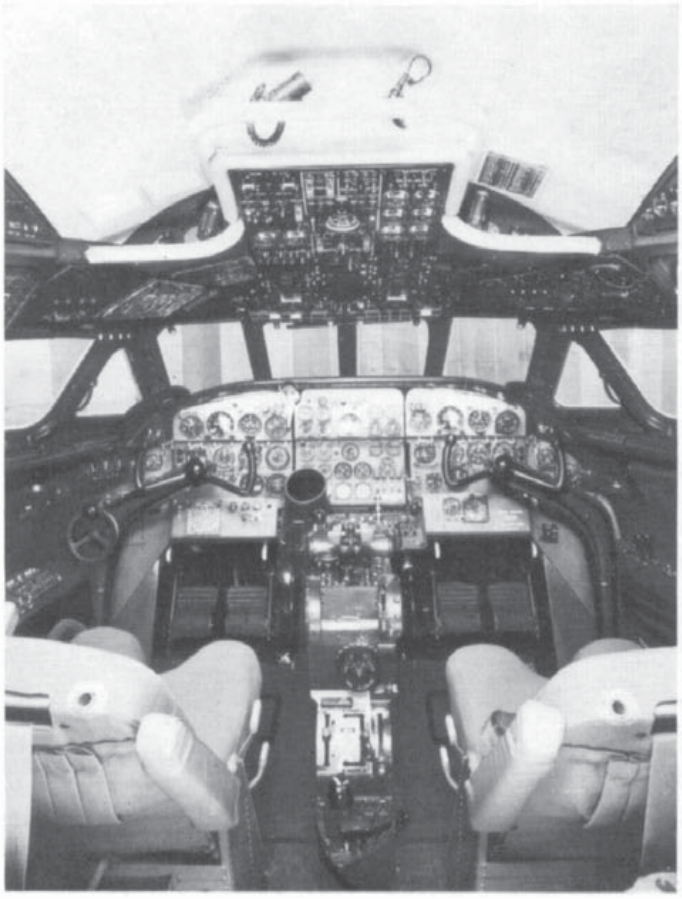
Since that time the Caravelle VI-R has proved itself second only to the Series III in popularity, and has been ordered by operators in Europe, the Middle East, North and South America. On 13th May 1963, Caravelle III c/n. 141 was assigned to the *Groupe de Liaisons Aériennes Ministérielles* of the *Armée de l'Air* as a presidential transport, and has since carried President de Gaulle and other senior government officials on many official visits both inside and outside Europe. The interior layout of this aircraft includes a forward saloon-cum-conference room, with seating for eight people, and a 38-seat rear cabin.

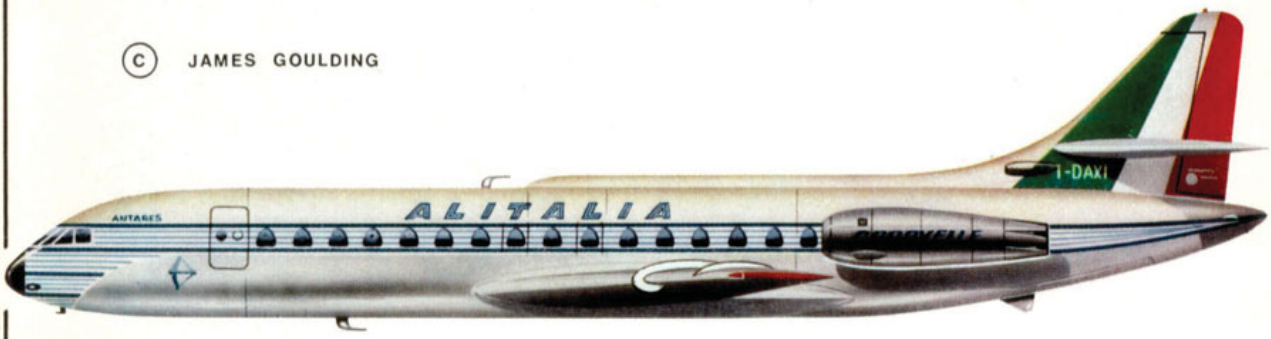
A well deserved tribute, both to the Caravelle and to the design team headed by Pierre Satre, came in 1964 when the famous Crédit Lyonnais banking concern celebrated its 100th anniversary by establishing a prize of F150,000 to be awarded annually for ten years for outstanding contributions to French industry and trade. On 14th December 1964, at the Académie des Sciences, the first of these awards was accepted by representatives of Sud-Aviation on behalf of the Caravelle. A further landmark was passed on 20th June 1965 when a new contract, appropriately from Air France, took the Caravelle order book past the two hundred mark.

Apart from the separate line of development involving the use of turbofan engines, the most significant advance in the Caravelle story in recent years has been the perfection of automatic landing equipment. The 01 prototype was the first to be used for such trials, making its first automatic landing on 29th September 1962. Joint trials by officials of the C.E.V. and the U.S. Federal Aviation Agency were carried out with this aircraft at Toulouse early in December 1962, using a system based on the Lear 102

(*continued on page 10*)

The "office" of Indian Airlines' VT-DUH, *a Caravelle VI-N.* (Photo: Sud-Aviation)



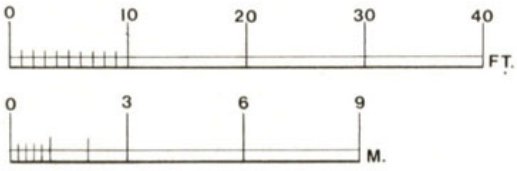


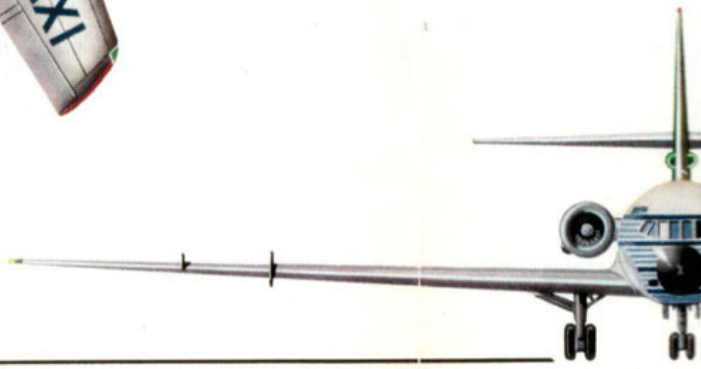
SUD-AVIATION CARAVELLE III,
SE 210-40, I-DAXI "Antares" of Alitalia. This aircraft was later converted to Caravelle VI-N configuration.

Sud-Aviation's "Caravelle" embl
painted low on ruc

SUD-AVIATIO
SE 210-40

Emblem of Alitalia.



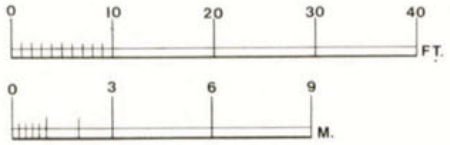


ANTARES

SUD-AVIATION CARAVELLE III, SE 210-40, I-DAXI "Antares" of Alitalia. This aircraft was later converted to Caravelle VI-N configuration.

Emblem of Alitalia.

Sud-Aviation's "Caravelle" emblem, painted low on rudder.

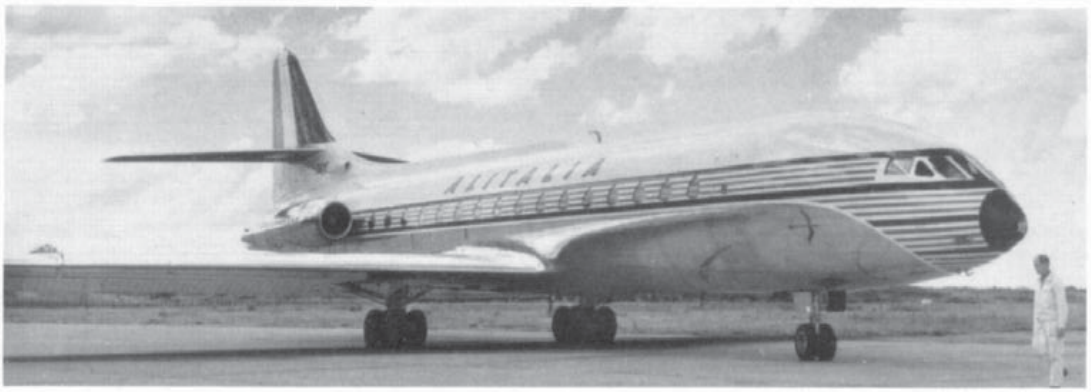


Emblem of Alitalia.

ANTARES

Sud-Aviation's "Caravelle" emblem, painted low on rudder.

SUD-AVIATION
SE 210-40

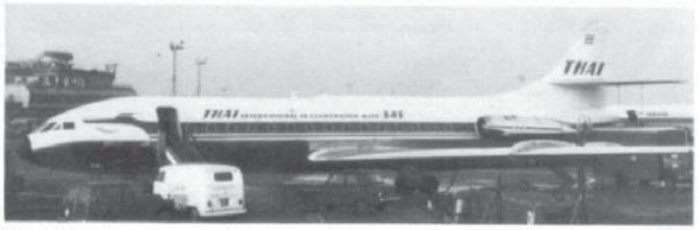


(Left) *Among the largest Caravelle fleets is that of Alitalia, whose original quartet of Caravelle III's* (I-DAXE *is shown*) *were subsequently converted to VI-N standard.* (Photo: Sud-Aviation)

autopilot; comparative trials of Smiths' Autoland were carried out with c/n. 143 (*F-WJSO*). The Lear system was chosen for further development, and was installed in c/n. 136 (*F-BLHY*) to carry out the certification programme for production Caravelles. During the first nine months of 1964, acceptance trials were conducted up to Phase II weather standards, certification being granted on 25th September. The first airline authorised to operate its Caravelles in accordance with these standards was Alitalia, which introduced the system in the spring of 1966. Development of the Sud-Lear equipment up to Phase IIIA weather standards continued during 1965-66; and early in 1967, when Phase IIIA certification was granted, some ten thousand automatic approaches had been carried out, including 3,500 actual touchdowns at 75 different airports. The first Caravelle to be delivered new with built-in Sud-Lear Phase IIIA automatic landing equipment was a Series III aircraft, *F-BNKC* (c/n. 211), handed over to Air Inter on 24th February 1967. (Air Inter's Caravelles, incidentally, have an all-tourist interior with an additional five seats, raising the maximum passenger capacity to 99. Its first services began on 6th March 1967, from Paris to Marseilles and Lyons, with two aircraft leased from Air France.)

Up to 1st March 1967, Caravelle production (all versions) had been authorised up to 260 aircraft, of which 225 had already been sold; 213 of these were already in service with 31 operators in 29 countries. The order book includes, in addition to the original batch of 32 Caravelle I/IA's, 66 Caravelle III's, 49 Caravelle VI-N's and 55 Caravelle VI-R's. In successively improved versions, the Caravelle has now been in continuous production for more than ten years. Such a record is nowadays less uncommon than it once was, but what is remarkable is the extremely small proportion—less than 5 per cent.—of second-hand aircraft in operation. The number of Caravelles lost in eight years of intensive airline operation throughout the world is likewise commendably low. More than half the Caravelles in service have amassed over

The new S.A.S. livery, introduced in 1966, is shown here on SE-DAF Sven Viking. (Photo: S.A.S.)



Thai International, which has four Caravelle III's on lease from S.A.S., operates these on its 'Royal Orchid' route from Bangkok to Tokyo. HS-TGF Suranaree (*c/n. 56*) *is shown at London Heathrow.* (Photo: Stephen P. Peltz)

ten thousand flying hours apiece, and a select few have reached nearly twice this figure. Operational regularity of 97·5 per cent. is maintained, and average load factors are well in excess of 60 per cent. Customer reaction to the second generation of fan-engined Caravelle variants seems to indicate that the design has insufficient 'built-in stretch' to remain fully competitive in the late 1960s, but the record of the earlier models speaks for itself—and speaks highly.

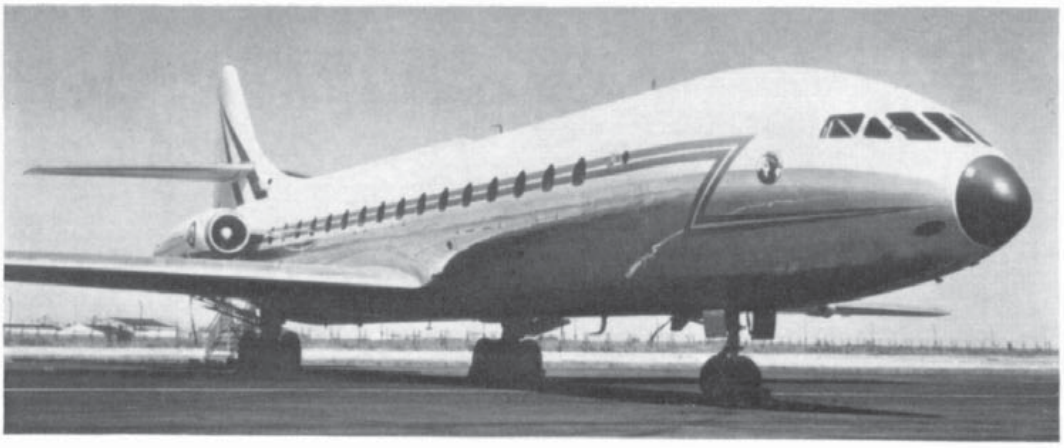
The author wishes to acknowledge his gratitude for assistance given in the preparation of this Profile *by MM. P. Gaillard of Air-Britain and François Rude.*

PRODUCTION AND OWNERSHIP RECORD

Caravelle I and Ia

C/n.	*Mk. No.*	*Regn.*	*Operator(s)*
01	(P)	*F-WHHH*	Last flown 16.4.66; now permanently displayed at Orly.
02	(P)	*F-WHHI*	Sud-Aviation.
1	I	*F-BHRA*	Air France *Alsace.*
2	I	*F-BHRB*	Air France *Lorraine.*
3	I	*LN-KLH*	SAS *Finn Viking.*
4	I	*SE-DAA*	SAS *Eskil Viking.*
5	I	*F-BHRC*	Air France *Anjou.*
6	I	*OY-KRA*	SAS *Vagn Viking.*
7	I	*LN-KLI*	SAS *Einar Viking.*
8	I	*F-BHRD*	Air France *Guyenne.*
9	I	*F-BHRE*	Air France *Artois.*
10	I	*PP-VJC*	Varig; Sud-Aviation; Air Viet Nam as *XV-NJA.*
11	I	*SE-DAB*	SAS *Ingemar Viking.*
12	I	*F-BHRF*	Air France *Auvergne.*
13	I	*F-BHRG*	Air France *Berry.*
14	I	*OY-KRB*	SAS *Orm Viking*; W/O. Ankara, 19.1.60.
15	I	*PP-VJD*	Varig; W/O. Brasilia, 27.9.61.
16	I	*F-BHRH*	Air France *Bourgogne.*
17	I	*F-BHRI*	Air France *Bretagne.*
18	I	*F-OBNG*	Air Algérie (later *7T-VAG*).
20	I	*F-OBNH*	Air Algérie; Varig as *PP-VJI*; Avensa as *YV-C-AVI.*
21	IA	*OH-LEA*	Finnair *Sinilintu* (Blue Bird); LTU as *D-ABAF Nordrhein-Westfalen.*
22	IA	*OH-LEB*	Finnair *Sinisiipi* (Blue Wing); Air France as *F-BJTR Vercors.*
23	IA	*F-BHRJ*	Air France *Champagne*; leased to MEA/Air Liban as *OD-AEM*; W/O. 17.4.64.
24	IA	*LN-KLP*	SAS *Trond Viking.*
25	IA	*SE-DAC*	SAS *Arne Viking*; leased to Thai as *HS-TGI Chiraprapa.*
26	IA	*F-BHRK*	Air France *Corse.*
27	IA	*OH-LEC*	Finnair *Sininuoli* (Blue Arrow); Air France as *F-BJTS Principauté de Monaco.*

(Right) *C/n. 141 serves with the* Groupe de Liaisons Aériennes Ministérielles *as a presidential and V.I.P. transport.* (B-R Photo.)



(Below) *A Caravelle III (c/n. 178) in the attractive red and white livery of Tunis Air.*
(Photo: Sud-Aviation)

C/n.	Mk. No.	Regn.	Operator(s)
28	IA	*F-OBNI*	Air Algérie (later *7T-VAI*).
29	IA	*OY-KRC*	SAS *Faste Viking*; leased to Thai as *HS-TGH Srisoonthorn*.
30	IA	*LN-KLR*	SAS *Hall Viking*.
31	IA	*F-BHRL*	Air France *Dauphiné*.
32	IA	*CN-CCV*	Royal Air Maroc.
34	IA	*SE-DAD*	SAS *Torolf Viking*; short lease to Thai without change of regn.; SAS.

All the above aircraft, except prototypes and c/n. 14 were converted to Series III.

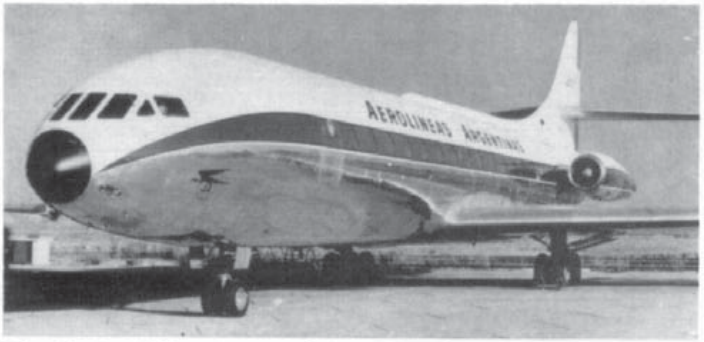
Caravelle III

C/n.	Regn.	Operator(s)
19	*F-WJAK*	Prototype; later converted as prototype Series VI-N; to Aerolineas Argentinas as *LV-PRR*, then *LV-HGX Aldebaran*.
33	—	Built for SAS, but leased to Swissair as *HB-ICW Solothurn*.
*35	*I-DAXA*	Alitalia *Altair*.
*36	*I-DAXE*	Alitalia *Aldebaran*.
37	*F-BHRM*	Air France *Quercy*.
38	—	Built for SAS, but leased to Swissair as *HB-ICX Chur*.
39	*F-BHRN*	Air France *Gascogne*.
*40	*I-DAXI*	Alitalia *Antares*.
41	*F-BHRO*	Air France *Ile de France*.
42	*F-WJAM*	General Electric as Series VII prototype *N420GE Santa Maria*; restored to Series III, to Air France as *F-BLKF Angoumois*.
43	—	Built for SAS, but leased to Swissair as *HB-ICY Lausanne*.
*44	*I-DAXO*	Alitalia *Deneb*.
45	*F-BHRP*	Air France *Languedoc*; leased to Sabena without change of regn; Air France.
46	*F-BHRQ*	Air France *Limousin*.
47	*OY-KRD*	SAS *Ulf Viking*.
48	—	Built for SAS, but leased to Swissair as *HB-ICZ Bellinzona*.
49	*OY-KRE*	SAS *Knud Viking*; leased to Thai as *HS-TGG Thepsatri*.
50	*F-BHRR*	Air France *Lyonnais*.
51	*F-OBNJ*	Air Algérie; leased to Air Liban as *OD-ADZ*; Air Algérie as *F-BLCZ*.
52	*F-BHRZ*	Air France *Flandre*.
53	*F-BJTA*	Air France *Comté de Nice*.
54	*F-BHRS*	Air France *Normandie*.
55	*F-BHRT*	Air France *Picardie*.
56	*SE-DAE*	SAS *Alrik Viking*; leased to Thai as *HS-TGF Suranaree*.

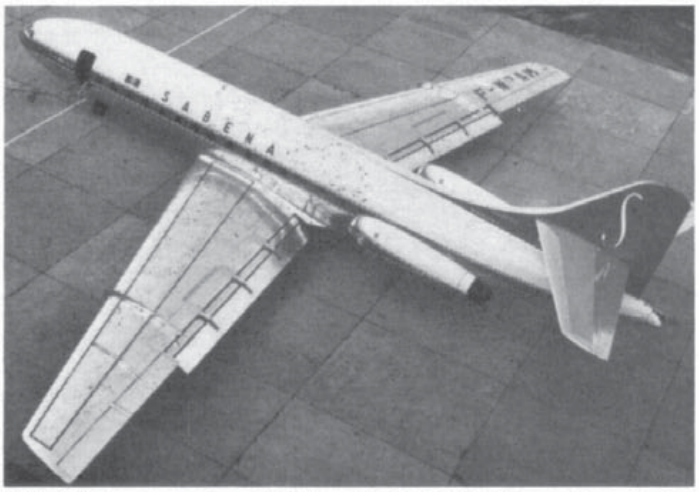
* *Converted to Series VI-N.*

C/n.	Regn.	Operator(s)
57	*CN-CCX*	Royal Air Maroc.
58	*F-BHRU*	Air France *Poitou*.
59	*F-BHRV*	Air France *Provence*.
60	*F-BHRX*	Air France *Savoie*.
61	*F-BHRY*	Air France *Touraine*.
68	*F-BJTB*	Air France *Béarn*; W/O. Rabat, 12.9.61.
83	*F-BJTC*	Built for Air France, but not delivered; leased to Air Liban as *OD-ADY*; Air France as *F-BKGZ Bourbonnais* (later *Comté de Foix*).
84	*F-BJTD*	Built for Air France, but not delivered; to Tunis Air as *TS-IKM*.
105	*F-BJTI*	Air France *Navarre*.
111	*F-BJTE*	Air France *Grenoble*.
112	*SE-DAF*	SAS *Sven Viking*.
113	*F-BJTF*	Air France *Orléanais*.
115	*F-BJTG*	Air France *Roussillon*.
116	*OH-LED*	Finnair *Sinipiika* (Blue Maid); to C.E.V. Brétigny October 1964.
119	*F-BJTJ*	Air France *Bourbonnais*; leased to Swissair as *HB-ICR*; Air France.
121	—	Built for SAS, but leased to Swissair as *HB-ICS Uri*.
122	—	Built for SAS, but leased to Swissair as *HB-ICT Schwyz*.
123	—	Built for SAS, but leased to Swissair as *HB-ICU Aargau*.
124	*F-BJTH*	Air France *Franche-Comté*.
141	*F-BJTK*	Air France *Principauté de Monaco*; to Armée de l'Air (G.L.A.M.) as presidential transport *F-RAFG*.
142	*F-BJTL*	Air France *Aunis et Saintonge*.
144	*F-BJTM*	Air France *Maine*.
145	*F-BJTN*	Air France *Marche* (later *Comminges*).
147	—	Built for SAS, but leased to Swissair as *HB-ICV Schaffhausen*; W/O. 4.9.63.
148	*F-BJTO*	Air France *Nivernais*.
152	*F-BJTP*	Air France *Comtat Venaissin*.

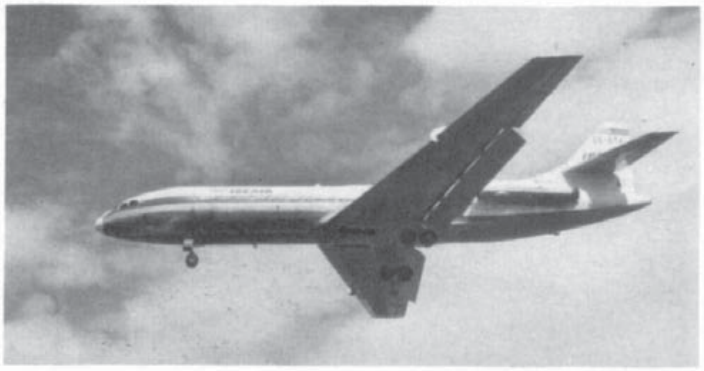
Among the more recent customers for the Caravelle III have been Air-Inter (c/n. 211, upper) and L.T.U. (c/n. 214, lower).
(Photos: Sud-Aviation)



The Series III prototype (c/n. 19) subsequently became the prototype for the Caravelle VI-N. It was eventually delivered to Aerolineas Argentinas as LV-PRR, *later becoming* LV-HGX.
(Photo: Sud-Aviation)



This bird's eye view of Sabena's OO-SRC (*seen here before delivery*) *shows flap detail and the tail parachute doors.*
(Photo: U.S.I.A.S.)



The attractive red, white and orange colours of Iberia are a frequent sight at Heathrow: EC-ATX Turina *coming in to land.*
(Photo: Brian M. Service)

C/n.	Regn.	Operator(s)
154	CN-CCY	Royal Air Maroc.
170	OY-KRF	SAS *Torkil Viking*.
172	SE-DAG	SAS *Dag Viking*.
177	F-BJTQ	Air France *Principauté de Monaco* (later *Champagne*).
178	TS-TAR	Tunis Air.
191	OY-KRG	SAS *Alf Viking*.
193	SE-DAH	SAS *Torgny Viking*.
195	CN-CCZ	Royal Air Maroc.
206	F-BNKA	Air France; leased to Air Inter.
207	TS-MAC	Tunis Air.
208	F-BNKB	Air France; leased to Air Inter.
209	LN-KLN	SAS *Roald Viking*.
210	SE-DAI	SAS *Alrik Viking*.
211	F-BNKC	Air Inter.
213	F-	Air Inter.
214	D-ABAM	LTU.
	F-	Air Inter.

Caravelle VI-N

C/n.	Regn.	Operator(s)
64	OO-SRA	Sabena.
65	OO-SRB	Sabena.
66	OO-SRC	Sabena.
67	OO-SRE	Sabena.
69	OO-SRD	Sabena.
70	OO-SRG	Sabena.
71	I-DABA	Alitalia *Regolo*.
72	I-DABE	Alitalia *Rigel*.
73	F-OBNK	Air Algérie (later 7T-VAK).
74	I-DABI	Alitalia *Sirio*.
75	F-OBNL	Air Algérie (later 7T-VAL).
76	OO-SRF	Sabena.
77	I-DABU	Alitalia *Vega*.
78	OO-SRH	Sabena.
79	I-DAXU	Alitalia *Canopo*.
80	I-DAXT	Alitalia *Polluce*.
81	I-DABR	Alitalia *Bellatrix*.
82	I-DABZ	Alitalia *Spica*.
85	I-DABT	Alitalia *Denebola*.
106	I-DABS	Alitalia *Dubhe*.
127	LV-PVT	Aerolineas Argentinas *Sirius* (later LV-HGY); W/O. Cordoba 3.7.63.
128	VT-DPO	Indian Airlines *Pavandoot* (Messenger of the Wind).
130	VT-DPP	Indian Airlines *Akashdoot* (Sky Messenger); W/O. 15.2.66.
132	I-DABL	Alitalia *Fomalhaut*.
134	VT-DSB	Indian Airlines *Vayudoot* (Sky Messenger); W/O. 4.9.66.
135	YU-AHB	JAT *Bled*.
139	YU-AHA	JAT *Dubrovnik*.
143	F-WJSO	Sud-Aviation for Smiths' Autoland tests; Alitalia as I-DABM *Procione*.
146	I-DABV	Alitalia *Acrux*.
149	LV-PVU	Aerolineas Argentinas *Rigel* (later LV-HGZ).
150	I-DABW	Alitalia *Betelgeuse*.
151	YU-AHD	JAT *Opatija*.
153	OD-AEE	MEA/Air Liban.
155	VT-DPN	Indian Airlines *Gangardoot* (Heavenly Messenger).
157	OD-AEF	MEA/Air Liban.
174	OD-AEO	MEA/Air Liban.
175	OO-SRI	Sabena.
179	I-DABF	Alitalia *Misar*.
180	LV-PBJ	Aerolineas Argentinas *Antares* (later LV-III).
192	I-DABP	Alitalia *Castore*.
194	YU-AHE	JAT *Budva*.
196	OO-SRK	Sabena.
203	VT-DUH	Indian Airlines.
204	VT-DUI	Indian Airlines.
205	I-DABG	Alitalia *Arturo*.
	F-	Air Algérie.
	VT-	Indian Airlines.
	VT-	Indian Airlines.

C/n. 118, photographed prior to delivery to Panair do Brasil, still bears its temporary French marks on the fuselage, but has the "last three" of its Brazilian registration (PP-PDU) *on the nosewheel door. Panair ceased operations in 1965, and its Caravelles are now operated by Cruzeiro do Sul.*
(Photo: Sud-Aviation)

A Series VI-N in the colours of Indian Airlines Corporation. (Photo: Sud-Aviation)

Caravelle VI-R

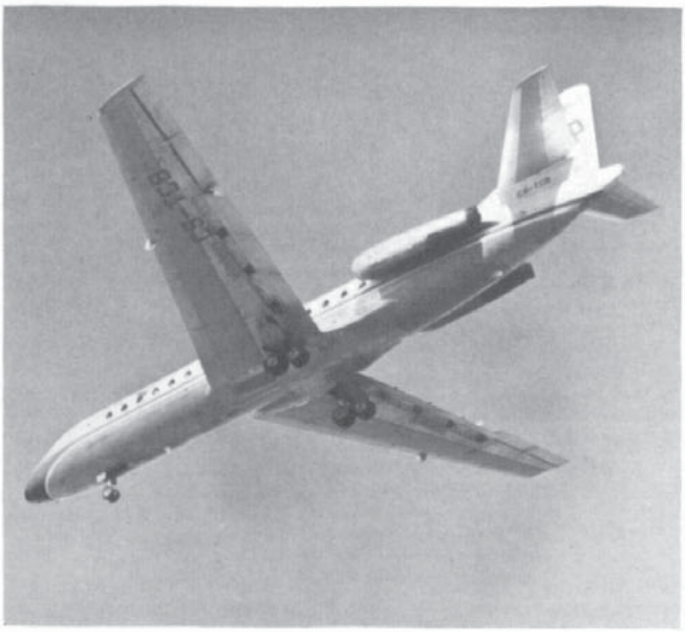
C/n.	Regn.	Operator(s)
62	F-WJAP	Prototype; to Cruzeiro do Sul as PP-CJC.
86	N1001U	United *Ville de Toulouse.*
87	N1002U	United *Ville de Cahors.*
88	N1003U	United *Ville de Marseille.*
89	N1004U	United *Ville de Paris.*
90	N1005U	United *Ville de Grenoble.*
91	N1006U	United *Ville de Saintes.*
92	N1007U	United *Ville de Coutances.*
93	N1008U	United *Ville de Rochefort.*
94	N1009U	United *Ville de Rouen.*
95	N1010U	United *Ville de Strasbourg.*
96	N1011U	United *Ville de Dijon.*
97	N1012U	United *Ville de Lille.*
98	N1013U	United *Ville d'Arles.*
99	N1014U	United *Ville de Nice.*
100	N1015U	United *Ville de Saint-Nazaire.*
101	N1016U	United *Ville de Nantes.*
102	N1017U	United *Ville de Cannes.*
103	N1018U	United *Ville de Bordeaux.*
104	N1019U	United *Ville de Lyon.*
107	EC-ARI	Iberia *Isaac de Albeniz.*
108	EC-ARJ	Iberia *Chapí.*
109	EC-ARK	Iberia *Granados.*
110	EC-ARL	Iberia *Manuel de Falla.*
114	N1020U	United *Ville de Calais.*
117	CS-TCA	TAP *Goa.*
118	PP-PDU	Panair do Brasil *Antão Leme da Silva*; W/O. 6.9.63.
120	PP-PDV	Panair do Brasil *Domingo Rodriguez de Carvalho*; Cruzeiro do Sul.
125	CS-TCB	TAP *Damão.*
126	PP-PDX	Panair do Brasil *Fernando de Camargo*; Cruzeiro do Sul.
129	PP-CJA	Cruzeiro do Sul.
131	PP-PDZ	Panair do Brasil *Francisco Diaz de Avila*; Cruzeiro do Sul.
133	PP-CJB	Cruzeiro do Sul.

F-BLHY (*c/n. 136*) *played an important rôle in certification of the Sud-Lear automatic landing system before becoming the fifth Caravelle VI-R in the fleet of Austrian Airlines.* (Photo: Sud-Aviation)

C/n.	Regn.	Operator(s)
136	F-BLHY	Sud-Aviation for Lear Siegler automatic landing tests; to Austrian Airlines as *OE-LCU Steiermark.*
137	CS-TCC	TAP *Dio.*
138	N210G	Garrett Corporation; operated by Iberia as *EC-AXU Alfonso X. el Sabio.*
140	CC-CCO	LAN-Chile.

Kingdom of Libya Airlines 5A-DAB *is one of the few Caravelles to have served with two operators; formerly it was with Finnair as* OH-LER. (Photo: Sud-Aviation)

Middle East Airlines/Air Liban Caravelle VI-N on the apron at Beirut. (Photo: M.E.A.)



C/n.	Regn.	Operator(s)
156	OE-LCE	Austrian Airlines *Tyrol*.
158	F-BLKI	Leased to Armée de l'Air as *F-RAFA*; to Kingdom of Libya Airlines as *5A-DAA*.
159	EC-AVZ	Iberia *Pablo Sarasate*.
160	CC-CCQ	LAN-Chile.
161	OE-LCA	Austrian Airlines *Wien* (Vienna).
162	PP-CJC	Built for Cruzeiro do Sul, but not delivered; leased to Finnair as *OH-LER*; to Kingdom of Libya Airlines as *5A-DAB*.
163	EC-ATV	Iberia *Tomás L. de Victoria* (now *Maestro Victoria*).
164	CC-CCP	LAN-Chile.
165	EC-ATX	Iberia *Turina*.
166	OE-LCI	Austrian Airlines *Salzburg*.
167	OE-LCO	Austrian Airlines *Kärnten*.
168	PP-CJD	Cruzeiro do Sul.
171	EC-BBR	Iberia *Padilla*.
173	EC-AVY	Iberia *Amadeo Vives*.
197	EC-AYD	Iberia *Juan Crisostomo Arriga*.
198	EC-AYE	Iberia *José Maria Usandizaga*.
202	EC-BDD	Iberia *Jesus Guridi*.
	5A-	Kingdom of Libya Airlines.

(Left) *A Caravelle VI-R of Transportes Aéreos Portugueses on approach at London Heathrow.*
(Photo: Brian M. Service)

(Below) *Cruzeiro's* PP-CJB *at Rio de Janeiro airport.* (Photo: Cruzeiro do Sul)

(Above) *LAN-Chile is one of five South American operators flying the Caravelle:* CN-CCO *was the first of three Series VI-R's for the Chilean carrier.* (Photo: Sud-Aviation)

(Left) *Although not delivered to United Air Lines, the Series VI-R prototype (c/n. 62) was decked out in the American operator's livery for demonstration purposes. This view shows the slightly domed cabin roof of this Caravelle variant.* (Photo: Sud-Aviation)

SPECIFICATION

	Srs. I/IA	Srs. III	Srs. VI-N	Srs. VI-R
Powerplant: Two Rolls-Royce Avon R.A.29 axial-flow turbojets	10,500 lb.s.t. (4,763 kgp.) Mk. 522 or 522A (526)	11,400 lb.s.t. (5,171 kgp.) Mk. 527B	12,200 lb.s.t. (5,534 kgp.) Mk. 531B	12,600 lb.s.t. (5,715 kgp.) Mk. 533R
Wing span	112 ft. 6⅜ in. (34·30 m.)			
Overall length	105 ft. 0¼ in. (32·01 m.)			
Overall height	28 ft. 7½ in. (8·72 m.)			
Gross wing area	1,579·06 sq. ft. (146·70 sq. m.)			
Tailplane span	34 ft. 9⅛ in. (10·60 m.)			
Main wheel track	17 ft. 1 in. (5·21 m.)			
Manufacturer's empty weight	51,588 lb. (23,400 kg.)	53,319 lb. (24,185 kg.)	54,928 lb. (24,915 kg.)	57,937 lb. (26,280 kg.)
Basic operating weight	58,642 lb. (26,600 kg.)	59,988 lb. (27,210 kg.)	60,253 lb. (27,330 kg.)	63,173 lb. (28,655 kg.)
Maximum payload	17,901 lb. (8,120 kg.)	18,276 lb. (8,290 kg.)	18,012 lb. (8,170 kg.)	18,398 lb. (8,345 kg.)
Maximum take-off weight	95,901 lb. (43,500 kg.)	101,413 lb. (46,000 kg.)*	105,822 lb. (48,000 kg.)	110,231 lb. (50,000 kg.)
Maximum landing weight	91,338 lb. (41,430 kg.)	96,563 lb. (43,800 kg.)	100,751 lb. (45,700 kg.)	104,984 lb. (47,620 kg.)
Maximum zero-fuel weight	77,162 lb. (35,000 kg.)	78,264 lb. (35,500 kg.)	78,264 lb. (35,500 kg.)	81,571 lb. (37,000 kg.)
Economical cruising speed (at 35,000 ft.—10,670 m.)	456 m.p.h. (734 km./h.)	451 m.p.h. (725 km./h.)	491 m.p.h. (790 km./h.)	488 m.p.h. (785 km./h.)
Service Ceiling	32,810 ft. (10,000 m.)	39,370 ft. (12,000 m.)	39,370 ft. (12,000 m.)	39,370 ft. (12,000 m.)
Range with maximum payload	1,150 miles (1,850 km.)	1,019 miles (1,640 km.)	1,451 miles (2,335 km.)	1,451 miles (2,335 km.)
Take-off distance at max. take-off weight	5,905 ft. (1,800 m.)	6,102 ft. (1,860 m.)	6,496 ft. (1,980 m.)	6,759 ft. (2,060 m.)
Landing distance at max. landing weight	5,774 ft. (1,760 m.)	5,905 ft. (1,800 m.)	6,365 ft. (1,940 m.)	5,643 ft. (1,720 m.)

* Fifteen Air France aircraft currently cleared for take-off at 105,822 lb. (48,000 kg.) with strengthened undercarriage and more powerful braking system.

PRINTED IN ENGLAND. © Profile Publications Ltd., P.O. Box 26, Leatherhead, Surrey, England
by George Falkner & Sons Ltd., for McCorquodale City Printing Division, London.

BELGIAN World AIRLINES

SUD-AVIATION SE 210-64

Caravelle VI-N, SE210-64, OO-SRA of Sabena Belgium World Airlines, 1967.

Sabena shield insignia.

Caravelle III, SE210-178, TS-TAR of Tunis Air, 1966. "Caravelle" insignia on nose.

Caravelle III, SE210-51, OD-ADZ of Air Liban, 1966. Originally built for Air Algérie and leased to Air Liban.

National flag of Lebanon.

Air Liban insignia.

Caravelle VI-R, SE210-140, CC-CCO of Lan-Chile, 1967.

Sud-Aviation's "Caravelle" insignia, usually carried on fin or rudder of each aircraft, is shown enlarged on the five-aspect drawing across the centre pages of this *Profile*.

Caravelle III, SE210-172, SE-DAG "Dag Viking" of Scandinavian Airlines System, 1965.

National shields of Norway, Denmark and Sweden.

National flag of Jugoslavia.

Caravelle IV-N, SE210-135, YU-AHB "Bled" of Jugoslovenski Aerotransport, 1967.

TAP insignia.

Caravelle VI-R, SE210-117, CS-TCA "Goa" of Transportes Aéreos Portugueses.

National flag of Portugal.