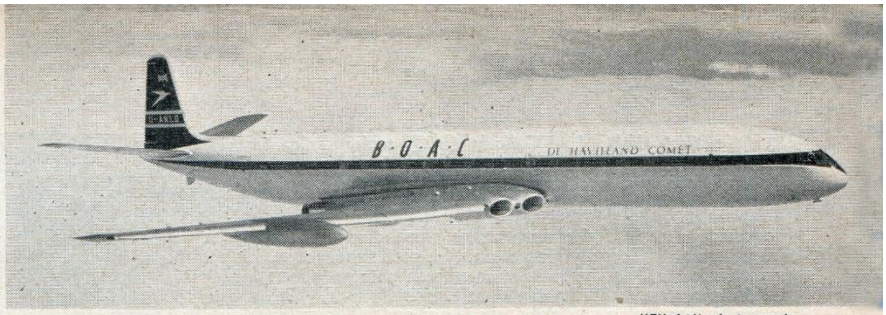
COMET 4C

More Payload on Medium Stages



The heading picture shows the Comet 3, development-prototype of the Comet 4 family.

"Flight" photograph

THE adaptability of the Comet 4 breed to changing market trends since the design for B.O.A.C. was announced in 1955 has been quite surprising. With no increase in power (a commodity which de Havilland's jet airliner has always enjoyed in ample measure) the strain has been so developed that we see today the 4C offering a ton more maximum payload than the 4. Obviously this has not been achieved without some penalty in range; but the 4C appears to be the deliberate outcome of applying the 4's ample power to lifiting payload rather than fuel.

This has been in direct response to the changing circumstances of the market. When the original Comet 4 design was settled the revolution of long-range travel had yet to be brought about by the Boeing 707 and the DC-8. At that time, in the early months of 1955, the emphasis in Comet 4 design was upon maximum range: even North Atlantic range was felt to be worth striving for. But the big American jets caused a change of emphasis, and thenceforth efforts were directed to improving the Comet for the medium-range rôle.

The 4A pointed the way (in July 1956) towards refinements in structure and drag (and increases in payload capacity) which led last September to the Comet 4B, the member of the family now aimed at the short-to-medium-haul operators. This aircraft in turn pointed the way to the lower seat-mile costs which result from the increased capacity of the lengthened fuselage—now logically conjoined with the original Comet 4 full-span wing to endow the 4C with maximum medium-haul economy.

The 4C, as will be seen from the table, does not have the maximum 3,000-mile stage-length potential of the 4, which remains the longer-haul member of the family. The Comet 4 continues to be aimed at operators who want a jet for long intercontinental trunk routes, but who do not feel justified in buying the big traffic capacity of the DC-8 and 707.

The table summarizes the salient points of each version. It will be noted that the Comet 4 itself has been considerably developed: its gross weight has now been raised from 152,500 lb to 156,000 lb (the same as that of the 4C); and particularly interesting is the way the 4's zero fuel weight—the factor which sets the structural (wing bending) limit upon payload—has been raised from its original 92,000 lb to 95,000 lb. Surprisingly, although it has the same wing, the 4C has an even higher z.f. weight than the 4.

Although the 0.74 Mach of the Comet 4C remains the same as for the 4 and 4B, structural considerations resulting from the increased payload and fuselage weight of the 4C make it necessary to reduce slightly the normal limiting I.A.S. This affects T.A.S. (i.e., block speed) only when the aircraft is operated below 33,000ft (the 4C's maximum-speed height), because at lower altitudes the maximum operating speed is dictated by I.A.S. and not by Mach number. On the longer stages, however, block time will rarely be reduced.

The payload range capabilities of the three types are shown in the graph, which includes fuel reserves as follows: ¾ hr holding at 15,000ft at destination; 220 n.m. diversion from 1,000ft; 5 min approach-fuel at destination; 1,000 lb final reserve fuel; and 4½ per cent *en route* fuel.

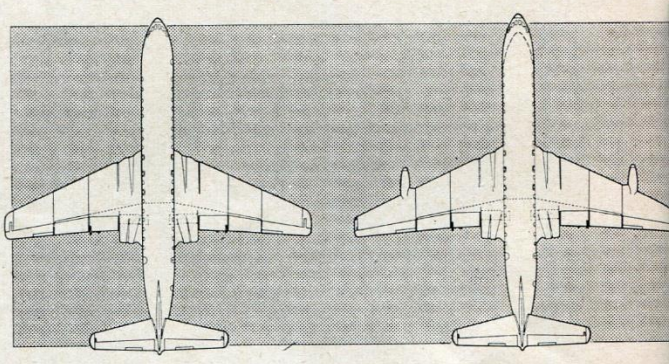
Take-off and landing performance of the 4C will hardly differ from that of the Comet 4, at the same weight. For example, at 156,000 lb, take-off field length in sea level standard conditions will be 6,770ft, rising to 9,500ft at 4,000ft-high aerodromes in I.S.A. plus 5 deg C. Similarly, landing-field length, to the proposed new British requirements and at maximum landing weight, will be 6,820ft at sea level in I.S.A. plus 17½ deg C conditions.

Direct operating costs of the 4B and 4C will be practically identical. The de Havilland company say that the 4C can be used "over the short stages of the Comet 4B's natural field of operation without any penalty in operating economics," adding that "a small increase in block time consequent upon its slightly lower I.A.S. limit will be no handicap except perhaps in those parts of the world where speed and extreme flexibility, which are the special attributes of the Comet 4B, are of paramount importance."

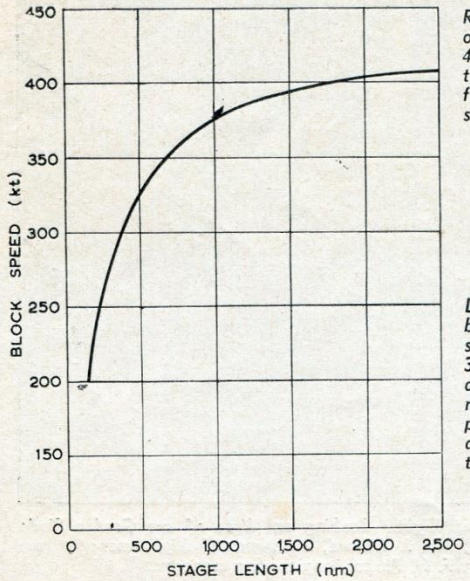
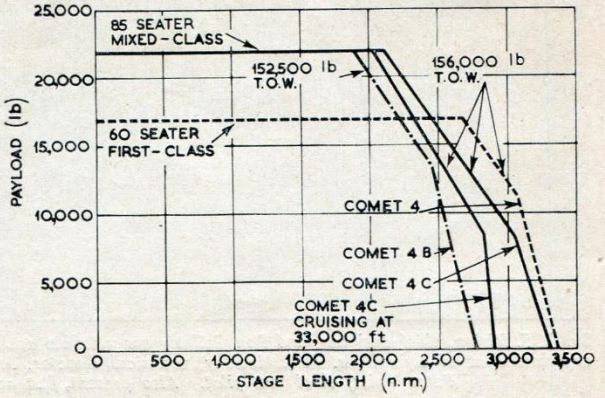
THE COMET FAMILY

Leading Particulars	Comet 4	Comet 4B	Comet 4C
Overall length, ft	111.5	118	118
Span, ft	115	107.8	115
Height to top of fin, ft	28.5	28.5	28.5
Wing area, sq ft	2,121	2,059	2,121
Maximum gross weight, lb	156,000	152,500	156,000
Maximum landing weight, lb	113,000	118,500	118,500
Maximum zero fuel weight, lb	95,000	102,500	102,500
Usable fuel capacity, Imp gal	8,990	7,850	8,990
Maximum stage length with capacity payload, st.m.	3,000	2,300*	2,475
Corresponding capacity payload, lb	16 800	21,968	21,785
Typical first-class seating capacity	60	84	84
Maximum tourist-class seating capacity	76	99	99

* Using long-range cruising procedure.



Right, a comparison of the 4B (left) and 4C. The 4 resembles the 4C except in fuselage length, shown by the dotted nose line.



Left, Comet 4C block speed ("high-speed cruise") at 33,000ft; I.S.A. + 10 deg C; 15 min terminal time. Right, payload-range. (For assumptions see text, column two.)