



## Airliners of the World

# FRIENDSHIP

ROYAL NETHERLANDS AIRCRAFT FACTORIES FOKKER, AMSTERDAM

**W**ITHIN six months of the Fokker F.27 Friendship's maiden flight in November 1955, six airlines had placed firm orders for the Dutch feederliner, and all told about 50 aircraft were the subject of firm orders or options. Significantly, the Friendship has appealed strongly to local-service airlines in the U.S.A., and it was a great encouragement to its makers—whose home market is small (K.L.M. have ordered two)—when Fairchild recently decided to build the Friendship under licence in the U.S.A.

The reasons for the Friendship's early sales success are not hard to seek. The aircraft is the outcome of thorough market research by the Fokker design team, and its layout and capacity were chosen to appeal to that vast market which, difficult to define in simple terms, is served by the veteran DC-3 and which still remains virtually untapped by a modern replacement aircraft.

But perhaps the Friendship's greatest attraction is that it offers the economy and sophistication of turboprop power to local-service and off-the-beaten-track operators, and its Rolls-Royce Darts, now so thoroughly established everywhere by the Viscount, were clearly the most logical choice of powerplant. Indeed, a trend toward employment of Friendships and Viscounts as partners has begun.

Fokker's market research pointed strongly to the need for a 28-36 passenger aircraft, with a large freight capacity, and having an optimum stage distance of about 300 miles. While the aircraft should include the most-up-to-date refinements, in particular cabin pressurization, it should also be kept simple and rugged and its interior designed to be as versatile as possible. A high-wing layout was chosen for reasons of increased aerodynamic efficiency, faster ground loading, and improved passenger view, and high aspect ratio (12) with high-efficiency compound flaps were adopted to achieve the best possible field performance.

Extensive use has been made by the Fokker company of British accessories, equipment and structural processes, and apart from Rolls-Royce the British industry's contributors include Rotol, Dowty, Aero Research, Dunlop, Standard Telephones, Smiths, Fibreglass, and Rumbold.

**Airframe.** The fuselage is of stressed skin, semi-monocoque construction consisting basically of two assemblies, front and main. The cross-section of the main pressurized cabin assembly comprises two circular segments of different radii, the cabin floor forming the common chord. The bottom of the main fuselage has been designed to provide extra strength against the possibility of a wheels-up landing. Emergency exits are combined with two of the cabin windows, and a floor-level emergency escape hatch is provided on the starboard side

of the cabin opposite the main entrance door. A large cargo door is included on the port forward side of the fuselage. Extensive use is made of Redux bonding in the attachment of stringers to skin.

The wing is of stressed-skin construction, and comprises the centre-section, which carries the engine nacelles, and two detachable outer-wing sections. The centre section and outer-wings each possess three main component parts: a rigid torsion cell; a leading edge section; and a trailing edge section. The torsion cell is formed by front and rear main spars, top and bottom skin panels, ribs, and closely spaced stringers. The spars are of particular interest; the booms are bonded angle laminations, and the change in section is achieved by progressively reducing the number of laminations to combine strength with lightness and simplicity of construction. Similar progressively laminated reinforcing panels are glued to the skin at the six main wing-junctions.

The outer wing is covered by a machine-tapered skin over the two inboard sections, and the integral fuel tanks are located between the front and rear spars. Flaps and ailerons are of conventional construction.

The stressed skin construction of the tailplane and fin is similar to that employed on the wings. Elevators and rudder are conventional.

The main undercarriage is an orthodox Dowty type oleo-pneumatic shock absorber fitted into a telescopic leg with twin Dunlop wheels, pneumatic brakes (Maxaret), and 60 lb/sq in tyres. The nose undercarriage is of Dowty levered-suspension "Liquid-Spring" type, with pneumatic power-steering by Dunlop.

**Powerplant.** The engines of the production Friendship will be Rolls-Royce Dart 511s of 1,600 s.h.p., driving Rotol 12ft four-blade airscrews. The prototype was initially fitted with Dart 507 engines (1,540 s.h.p.) and 10ft airscrews, but has recently been re-engined to production standard.

The engine nacelles are in three sections: (1) nacelle centre-piece, having a fixed connection with the wing and containing the engine-mounting brackets, main undercarriage, and water/methanol tanks; (2) detachable powerplant complete with airscrew and cowling, and (3) detachable tail portion housing electrical equipment. At the forward end of the centre-piece is a fireproof bulkhead through which passes the outwards-inclined shrouded jet pipe. The Rotol auxiliary gearbox is mounted flat in a separate compartment behind the firewall, with the majority of accessories vertical.

**Flight Deck.** The flight deck comprises a pilot and co-pilot who have access to all controls and equipment. Provision is made behind the flight deck bulkhead for a third crew member if required. There are two conventional flight panels, one for each pilot, with engine instruments between. The central control pedestal includes throttles, fuel cocks, trimmers, flap levers and undercarriage selection. The overhead panel