## C.115P

Issued to Handley Page Ltd on 25 October 1951 for a small number of Hastings C.2 aircraft to be converted as Hastings C.4 (VIP) to OR.266/2.

### REQUIREMENT

This specification was for the VIP transport role to replace the Avro York aircraft in use in that role at the time. The Specification referred to Handley Page drawings proposing the separation of the passenger accommodation into three cabins, to serve the aircraft crew, four VIPs and the staff travelling with the latter. The finish of the furnishings and fittings was 'to be comparable to that demanded by the British Overseas Airways Corporation (BOAC) for their route aircraft'. A flagpole was to be provided on the port side of the cabin roof, the radio fit was to be capable of receiving standard BBC transmissions 'as in Field Marshal Montgomery's Dakota', and each cabin was to have its own toilet accommodation 'similar to those fitted in the VIP Valetta'.

**Handley Page Hastings C.4 WD500 just after delivery, prepared for its official Air Ministry photographs in October 1951. The first VIP Hastings, WD500 served with No.70 Sqn, carrying the name *Hibernia*.** *(via Phil Butler)*

### OUTCOME

As delivered, the prototype Hastings C.4 (WD500) and the follow-on aircraft (WJ324 to WJ326) were designated as HP.94 and fitted with increased fuel tankage compared to the standard C.2 version, and all 'standard Hastings equipment' not required for the VIP role was deleted.

## T.116D

Issued to de Havilland Aircraft Ltd and dated 24 October 1951, the Specification was for a Prototype Advanced Trainer to OR.278, developed from the F.4/48.

### REQUIREMENT

This called for a two-seat dual control version of the F.4/48 for pilot conversion, instrument and gunnery training.

### PERFORMANCE

To be the same as the F.4/48 in all respects but any weight savings made were to improve endurance.

### ENGINE INSTALLATION

Two Rolls-Royce Avons with 1500 °K engine reheat.

### CREW

One pupil and one instructor as per Specification F.4/48.

### ARMAMENT

Four 30 mm ADEN cannon with ammunition for 10 seconds fire per gun. Provision was to be made for firing in pairs.

### OUTCOME

This was a dual-control version of the DH.110 to be used for pilot conversion, instrument flying training and gunnery training. The AI radar was to be deleted and replaced by duplicated GGSs with radar-ranging but the standard armament of four 30 mm ADEN cannon was to be retained. The aircraft was required to operate at a higher landing rate than the standard fighter version (six landings per hour), and similarly to operate at 'full throttle' for a higher proportion of its flying time. This Specification was withdrawn during 1953, after the RAF had decided to use the Gloster Javelin in place of the DH.110. No prototype of the T.116D was ordered.

## GR.117P

Specification GR.117P called for production of the Gannet AS.1, to NSR NA.9 and was issued to Fairey Aviation Ltd on 24 October 1951.

### REQUIREMENT

The aircraft was to conduct anti-submarine search, attack and shipping reconnaissance by day and night in areas where enemy fighters were unlikely to be encountered. It was to operate from carriers and land bases around the world.

### PERFORMANCE

The top speed at 5,000 ft (1,524 m) was not to be less than 265 kt (491 km/h) and the aircraft must be comfortable to fly on one engine at speeds 'well below 150 kt'

**Fairey Gannet WE488 was the third GR.17/45 prototype and, aerodynamically at least, similar to the production Gannet defined by GR.117P.** *(via Phil Butler)*



**Fairey Gannet T.2 WN365, seen here after its conversion from an AS.1 for T.117D&P. The colour scheme is silver with yellow bands.** *(via Phil Butler)*

(278 km/h). The rate of climb was unimportant. Fuel reserves were required for five minutes at full power and three hours endurance at 5,000 ft (1,524 m) or below. AUW was not to exceed 19,600 lb (8,890 kg) including a weapon load of 2,373 lb (1,076 kg).

### ENGINE INSTALLATION

One Armstrong Siddeley Double Mamba Mk.10001 ECU.

### CREW

Pilot, observer and aircrewman. A simple means of conveying a written message of maximum folded size 2.75 × 1 × 1 in (7 × 2.5 × 2.5 cm) between centre and rear cockpits is required.

### ARMAMENT

**Strike role** – one Pentane, two Dealer B, six Mk.11 depth charges, 16 3 in RP, eight Rockets (illuminating) or eight practice bombs.

**Search role** – eight anti-submarine training indicators, four T.1946(DRSB1), 18 × T.1945(NDRSB), six marine markers and four flares.

**Mining role** – two A Mk.7 or four A Mk.8 or two A Mk.10 or two A Mk.A Type S or one A Mk.12 mines plus four marine markers and four flame floats.

### OUTCOME

The Gannet AS.1 was based on the earlier prototypes built to Specification GR.17/45, of which the third aircraft, WE488, most closely resembled the eventual production aircraft. A production order for 100 Gannets had been placed earlier in 1951, commencing with WN339. The Gannet AS.1 formally entered service with 826 NAS at RNAS Lee-on-Solent on 17 January 1955.

## T.117D&P

The T.117 Specification from 9 April 1952 called for a dual-control trainer version of the AS.1, to NSR/NA.33.

### REQUIREMENT

This Specification covered the development and production of the Gannet T.2.

### ENGINE INSTALLATION

One Armstrong Siddeley Double Mamba Mk.10001 ECU.

### CREW

Pilot and Instructor. The front cockpit was to be the pupil's cockpit and identical to the Gannet AS.1. The second cockpit was to be the instructor's and 'like the Gannet AS.1 as much as possible'. Two passenger seats were to be fitted in the third cockpit for use in reinforcing flights.

### ARMAMENT

As Gannet AS.1 and releasable by the pupil in the front cockpit.

### OUTCOME

A batch of 23 Gannet T.2s was included in a further production order for the AS.1 version placed one month after the issue of T.117D&P. The front cockpit was to become the seat for the pupil pilot and was to be identical to that of the AS.1, including provision for releasing all the types of weapons carried by the anti-submarine type. In the interests of minimising changes from the AS.1, the observer's (third) cockpit was retained but was to be fitted with two passenger seats in lieu of the electronic equipment installed in the Mk.1. The prototype T.2 was converted from an early AS.1, WN365, making its first flight on 16 August 1954.

## T.118D

Issued on 24 October 1951, T.118D referred to OR.278 Issue 2, which required a two-seat dual control version of the Gloster Javelin day/night fighter.

### REQUIREMENT

This called for a two-seat training version of the Javelin fighter for pilot conversion, instrument and limited armament training, differing from the F.4/48 only in respects that were dictated by the training function. The cockpit was to be redesigned to accom-

**Seen here in formation with Javelin FAW.7 XA644 is WT841, the prototype Javelin T.3. Of note is the longer nose, made necessary by the removal of the air interception radar.** *(Russell Adams P411/56/Jet Age Museum)*

## F.153D

Dated 17 March 1955 and issued to Gloster Aircraft, F.153D covered the Thin-Wing Gloster All-Weather Fighter to SoP C.53281/53.

### REQUIREMENT

The aircraft was to be prepared to the same basic standard as the basic Javelin fighter prepared to the requirement OR.227 and Specification F.4/48. The F.153D development was associated with that of the AI Mk.18 radar and the Red Dean guided weapon, with deliveries to begin in 1958.

### PERFORMANCE

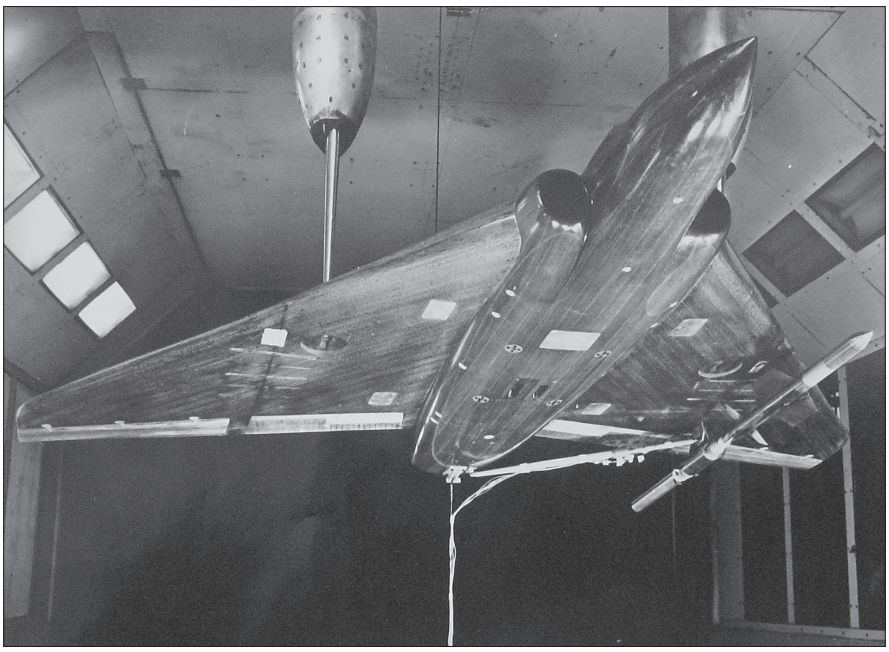
The best possible performance that could be obtained was required with particular attention to the 1,000 ft/min (305 m/min) rate of climb. The rate of roll was to be such that when flying straight and level at maximum speed, not more than one second should elapse from the time the pilot begins the to apply aileron to the aircraft reaching 100° of bank. In addition, the aircraft should have the greatest possible range on internal fuel. The take-off and landing distances should be such that the aircraft could be operated from 2,000-yard (1,828 m) runways by normal service pilots.

### ENGINE INSTALLATION

The engines were to be two Bristol Olympus B.Ol.6s, with the airframe able to accommodate later versions of the engine. Provision should also be made for the Bristol reheat installation.

### ARMAMENT

A pair of ADEN 30 mm cannon plus two Vickers Red Dean or two Vickers Red Hebe or four de Havilland Blue Jay guided weapons. Red Dean was to use pulsed radar guidance while Red Hebe was to use continuous-wave radar guidance which was considered less susceptible to jamming than pulsed guidance.



**This wind tunnel model of the Gloster P.356 carries a Red Dean AAM under its port wing. P.356 was the first proposal for a 'Thin Wing' Javelin to meet F.153D.** *(Blue Envoy Collection)*

### RADIO EQUIPMENT

AI.18 radar, GEE Mk.3, UHF, IFF Mk.10, ARI.18006 TORIST (continuous wave jamming homer), Black Maria FIS Mk.4 and instrument landing systems.

### OUTCOME

In accordance with normal policy it was required that the Javelin all-weather fighter should be developed to its maximum potential, albeit that a redesigned wing and more powerful engines were required to achieve the desired improvement. A batch of 18 P.370 Thin-Wing Javelins had been ordered in January 1955 and construction had begun but during its development the aircraft's AUW had risen to 50,000 lb (22,675 kg). This proved to be a very large aircraft with a span of 61 ft (18.6 m) and length of 72 ft (21.9 m). A design study was also underway for a type P.376 supersonic version of the Javelin. However, the Air Staff then took the decision to standardise its fighter requirement on the Lightning and Saro SR.177 aircraft and consequently the Javelin Thin-Wing project was cancelled in 1956.

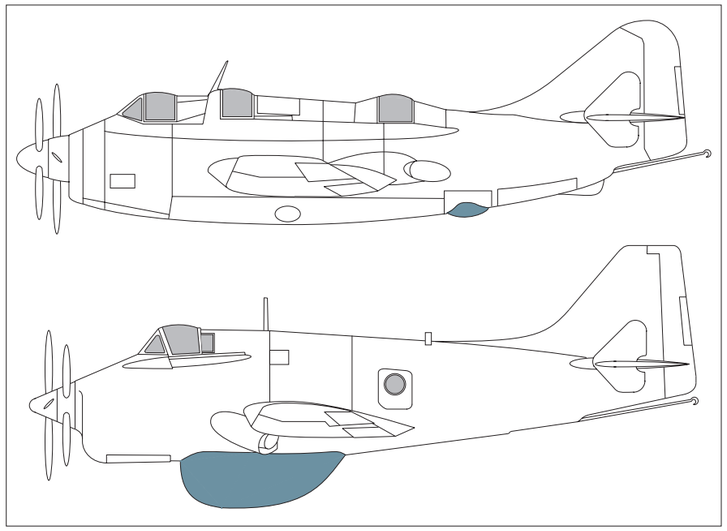
## AEW.154D

This Specification was issued to Fairey on 11 August 1955 and covered the development of a carrier-borne AEW aircraft to replace the FAA's Douglas Skyraider AEW.1.

### REQUIREMENT

As the RN moved away from gasoline-fuelled reciprocating engines to kerosene-fuelled gas turbines, AEW.154D was superseded by Specification AEW.154D&P (development and production) on 30 November 1956. The associated requirement was NSR/NA.64. The AEW.154D&P was to be based on the Gannet AS.1, possess good all-weather day and night flying characteristics and be capable

**A Gannet AEW.3 of 849 NAS B Flight is lined up for launch from HMS *Ark Royal*. The crewman handling the catapult bridle lends scale to the size of the radome.** *(via Terry Panopalis)*

*Above:* **A pair of Gannet AEW.3s await launch from HMS *Ark Royal* in 1978. Gannets were launched before the strike package, comprising Phantom FG.1s and Buccaneer S.2s, to direct operations and provide radar cover for the fleet.** *(via Terry Panopalis)*

*Left:* **Comparison of the ASW and AEW variants of the Fairey Gannet. The AEW version to meet Specification AEW.154 was so radically different that the Admiralty proposed calling it the Albatross. Once the ASW variants had been retired, any potential confusion had been averted.** *(Chris Gibson)*

of operation in all areas of the world. Its main functions were to be:

a) Provision of early warning of approaching enemy aircraft at sea;
b) Assistance in the direction of friendly fighters;
c) Snort detection (British forces referred to the *schnörkel* equipment of a diesel-electric submarine as a 'snort');
d) Surface reconnaissance (marine traffic surveillance, what was referred to as the surface picture);
e) Direction of strikes.

## PERFORMANCE

The aircraft was to be capable of making a 1.25*g* level turn and have a rate of climb of 800 ft/min at 20,000 ft (244 m/min at 6,069 m) and its normal operating altitude varyied between 3,000 ft and 20,000 ft (914 m and 6,096 m). At the maximum design take-off weight, the level speed was to be 235 kts (435 km/h) and with 60% internal fuel the aircraft was to maintain a comfortable continuous speed at 3,000 ft (914 m).

## ENGINE INSTALLATION

The aircraft was to be powered by one Armstrong Siddeley ASM D.8 turbo-propeller engine to specification DEngRD.2383. This engine chosen was the Armstrong Siddeley Double Mamba rated at 3,875 ehp (2,890 kW).

## CREW

A pilot and two radar operators, with the latter seated side-by-side in an operators' cabin in the rear fuselage.

## RADIO/RADAR

The main instrument was to be the AN/APS.20E radar in a ventral radome, a modified and updated version of the same radar used on the Skyraider AEW.1. This was to be fitted with a GPI Mk.5 ground position indicator and a radar stabilisation control unit. Other radio equipment was to include IFF Mk.10, ARI.5875, AN/APX-7 IFF Interrogator, HF radio set ARI.18032, ARI. 18049 (Green Salad wide-band homing equipment) and AN/ARN.21 (TACAN navigation set).

## ARMAMENT

Four marine markers or reconnaissance flares.

## OUTCOME

The outcome of the Specification was the Gannet AEW.3 with the first prototype XJ440 making its first flight on 20 August 1958 with the first production example, XL449, flying in December that year. The Gannet AEW.3 entered service with 849 NAS in February 1960. A total of 44 Gannet AEW.3s was built and the type served with the RN until December 1978 when HMS *Ark Royal* was paid off.

The anti-submarine Gannet fuselage was modified to such an extent that the type was to be given a completely new name, Albatross, to avoid confusion with ASW Gannets. However, the adoption of helicopters for the anti-submarine task and the transfer of the ASW Gannets to Carrier Onboard Delivery (COD) and ECM duties as the COD.4 and ECM.6 respectively meant that such confusion would not occur, and the Gannet name was retained.



# F.155T

Specification F.155T was issued on 15 January 1955 for a Day/Night High Altitude Supersonic Fighter (HASF) to OR.329, but within seven months had been superseded by F.155T2, issued on 5 July 1955.

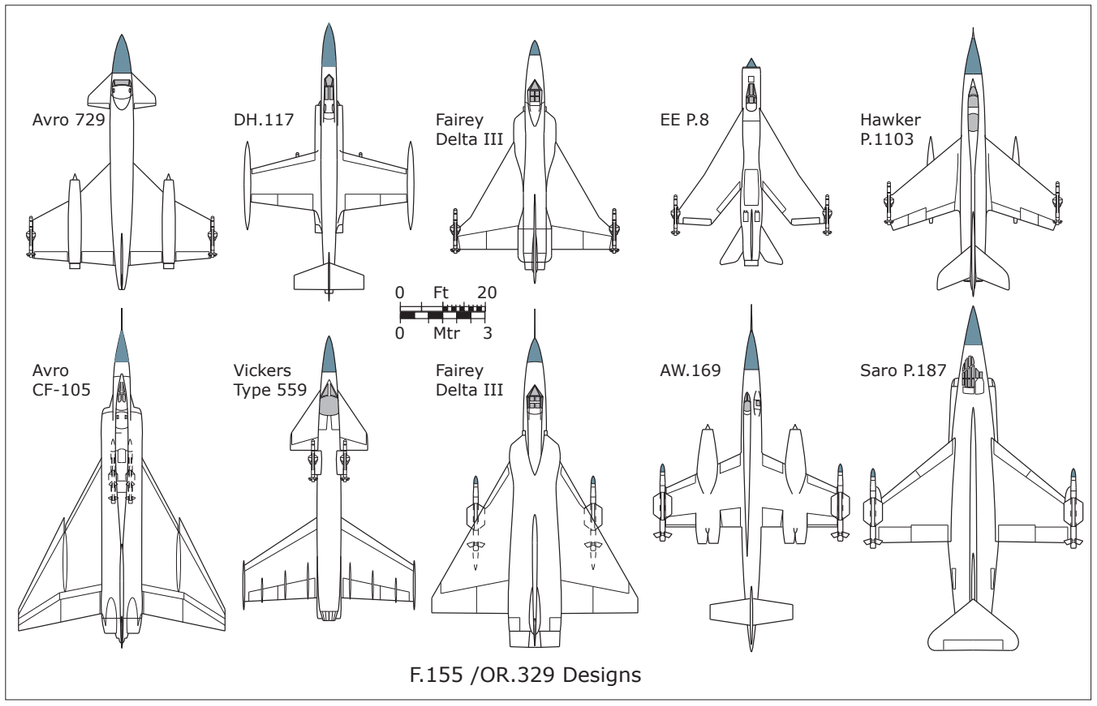
## REQUIREMENT

This specification grew from a need to develop an interceptor to defend the UK against incoming Soviet bombers. Although the ultimate goal was defence by guided weapons (surface and air launched), their status in the period 1953-55 was still uncertain and there was no guarantee that their range and capability would meet the threat. There were also concerns that any long-range guided weapon would require mid-course guidance, further complicating their development. Therefore, there was a perceived need for an aircraft to defend the UK until such time as the guided weapons could be fielded and so the Air Staff opted to develop a long-range supersonic interceptor as the HASF to meet OR.329 and enter service not later than January 1962.

Given the complexity of the task, the aircraft and associated equipment, further requirements were issued. The main ancillary requirement was OR.3576 covering a radar that, given the probable speeds of both target and attacker (the HASF), the radar should give long range and wide coverage and work with an improved ground control system. These, plus the probability of enemy countermeasures and problems associated with accurate flying at supersonic and transonic speed, made it necessary to carry a radar operator in addition to the pilot. Further requirements included OR.915 for an auto-control system, OR.3038 for a navigational system and OR.946 covering flight control instruments. In light of the required ceiling, rate of climb, speed and acceleration, it was accepted that, in addition to normally aspirated engines, rocket power should be employed.

## PERFORMANCE

A maximum level speed at 60,000 ft (18,288 m) was to be no less than Mach = 2.0 and the aircraft was to be capable in level flight at 60,000 ft (18,288 m), of accelerating from Mach = 1.0 to Mach = 2.0 in approximately one minute. Rate of climb was to sufficient to climb to an attacking position at 60,000 ft (18,288 m) and Mach = 2.0 in not more than seven minutes from brake release. The aircraft's 1.5*g* ceiling at Mach = 1.3 was to no less than 65,000 ft (19,812 m). The aircraft was to have sufficient endurance on internal fuel to complete the 'short warning time' sortie. Provision was also to be made for subsonic drop tanks in order that 'standing patrol' requirements could be met.




**The many and varied proposals for F.155T including the Avro CF-105 Arrow. The Fairey Delta III (Large) and AW.169 were most favoured by the tender assessment staff.** *(Chris Gibson)*

**To meet Specification C.235 for a trials aircraft for navigation systems, Specification C.212 was used as the basis and Comet 4C XS235 *Canopus* was converted and fitted with a comprehensive suite of navigation aids and the equipment to record and analyse trials. *Canopus* survives at Bruntingthorpe in Leicestershire.** *(A-BDC)*

Decca Mk.8, Dectra, Radio Altimeters Mk.6A and Mk.7, civil transponder equipment, two VOR. Two F49 cameras with 6in (15cm) lenses were also to be fitted.

### PASSENGER SECTION

Two BOAC-type tables and eight BOAC-type seats were to be installed along with 16 backwards-facing Transport Command-type seats.

### PERFORMANCE

The aircraft, in clean condition, was not to be inferior to that built to meet C.212D&P.

### OUTCOME

One Comet 4C, XS235, named *Canopus* , was built at Chester for use by the A&AEE and has survived in non-flying condition at Bruntingthorpe.

## FGA.236D&P

This specification was issued to the Hawker Blackburn division of HSA on 29 March 1963 and covered the development and production of an improved version of the Hawker P.1127 Kestrel FGA.1.

### REQUIREMENT

The aircraft was to be used in a tripartite evaluation of the operational, training, logistics and servicing problems of V/STOL aircraft. It was required to operate in the close support and reconnaissance roles from small dispersed sites, with a minimum of attention and support. Exposure to all types of weather was to be a design consideration. The design was aimed at providing a fatigue life of not less than 3,000 flying hours.

### PERFORMANCE

The aircraft was to take-off vertically from a smooth horizontal surface and climb away from the ground effect at a weight of not less than 12,400 lb (5,623 kg) at unstick. At a weight of 15,000 lb (6,802 kg) the distance from rest to clear a 50 ft (15 m) screen for a short take-off was not to exceed 1,500 ft (457 m) at take-off weight and the aircraft should reach 36,000 ft (10,973 m) in five minutes from rest. The ceiling should not be less than 45,000 ft (13,716 m). The speed at sea level was to be Mach 0.92 and at 36,000 ft (11,222 m), Mach 0.96.

The characteristics of the control system were to be such that no objectionable flying qualities resulted at any speed or configuration or during changes therein, within the flight envelope. It was to be possible for a pilot of reasonable skill to make consistent and accurate take-offs and landings into the restricted spaces envisaged for the operation of this type of aircraft.

**The first Kestrel FGA.1, XS688, is seen here in the colours of the TES. XS688 survives in the Museum of the USAF at Wright Patterson AFB, Ohio.** *(BAE SYSTEMS)*

Basic weight was to be 10,390 lb (4,712 kg), weight without pilot but full internal fuel and two 100 gallon (455 litre) drop tanks was to be 17,130 lb (7,769 kg). Maximum landing weight was to be 12,500 lb (5,668 kg) and combat weight was to be 13,000 lb (5,896 kg). The type's ferry range was to be not less than 1,070 nm (1,982 km) with 10% reserve fuel.

### RADIO AND NAVIGATION

UHF and UHF homer.

### ENGINE INSTALLATION

One Bristol Siddeley BS.Pg.5 turbofan to specification DEngRD.2633, rated at 15,200 lb st (61.6 kN) under special conditions. The airframe structure was to be adequate to cater for the engine being developed to produce 18,000 lb st (80 kN) static thrust.

### OUTCOME

Originally destined for participation in a NATO competition, nine developed P.1127 aircraft designated as Kestrel FGA.1, XS688-XS696, were ordered by the MoD and completed during 1964 and 1965, the first of which flew on 7 March 1964. These formed the Tripartite Squadron at RAF West Raynham which included pilots from the RAF, the USA and West Germany. A very concentrated flying programme took place over an 11-month period and at its end six of the Kestrels, XS688-XS692 and XS694, were purchased by the USA where, as the XV-6A, they underwent extensive US Tri-Service assessment. Meanwhile XS693 was modified at Brough to accommodate an upgraded Pegasus 6 engine, thus effectively becoming a prototype for the RAF's production aircraft.



## C.237D&P

This specification covered the development and production of the Avro 748MF tactical transport aircraft that became the Andover C.1 to meet ASR.377 and was issued to the Avro Whitworth Division (Manchester) of HSA on 3 April 1963.

### REQUIREMENT

The aircraft was to be constructed and equipped in accordance with the Type Specification for a STOL Tactical Transport (Issue 4 dated January 1963), which formed part of this specification and in accordance with BCARs except for those changes introduced to meet military requirements.

The aircraft was required for worldwide operations in the following roles: air-landed and airborne assault, supply dropping, aero-medical evacuation, carriage of passenger and freight and ferrying.

The cargo compartment was to be not less than 39 ft (11.9 m) long and its minimum internal cross-section was to be the major segment of a circle of 8 ft 1¾ in (2.5 m) diameter and chord of 6 ft 10 in (2.1 m). The size of the rear loading aperture was to be such to give a minimum of 3 in (76 mm) clearance between the cargo envelope and any part of the aircraft.

The aircraft and its equipment must have been able to achieve periods of 400 hours flying or six months elapsed time, without the need for other than first line servicing.

**Andover E.3 XS640 in the colours of No.115 Sqn based at RAF Benson. The E.3 and E.3A carried out approach radar and landing aid calibration duties. Two C Mk.1 (PR) were operated under the Open Skies Treaty. XS640 was sold to Air Katanga for operations in southern Africa and was written off in 1999.** *(via North East Land Sea and Air Museum)*

The aircraft was required in service, with full CA Release, not later than the second quarter of 1964.

### PERFORMANCE

The aircraft was to be capable of carrying a maximum payload of 12,000 lb (5,442 kg) over a stage length of 450 nm (833 km) and 10,000 lb (4,535 kg) over 750 nm (1,389 km) with appropriate reserves of fuel. For STOL sorties the take-off and landing to clear a 50 ft (15 m) obstacle was not to exceed 1,500 ft (457 m). Cruising speed was not to be less than 200 kt (370 km/h). It was also to be safe and practicable to drop paratroops at a speed not exceeding 115 kt (213 km/h). The aircraft was to have an unrefuelled ferry range of 2,700 nm (5,000 km).

### ENGINE INSTALLATION

Two Rolls-Royce Dart 12 turboprops rated at 2,995 shp (2,233 kW).

### CREW

Two pilots and one navigator.

### OUTCOME

Known initially to the RAF as the Avro 780, the prototype HS.748MF Andover C.1 XS594 first flew on 9 July 1965. In all, 31 C.1s serialled XS594-XS613 and XS637-XS647 were built for the RAF, with the type entering service in December 1966.

**The fulfilment of Specification C.237 was the Andover C.1. The Andovers of No. 46 Sqn are seen here lined up at RAF Abingdon in December 1966. By 1971 the RAF's commitments East of Suez had wound down and by 1975, save for a few Andovers with No.115 Sqn, the Andover had gone.** *(Terry Panopalis Collection)*