

RESTRICTED

AIR PUBLICATION

4377A

VOLUME 1

BOOK 2

SECT. 5, CHAP. 1-5

**VALIANT B Mk. 1, B/PR Mk. 1,
B/K Mk. 1 and B/K/PR Mk. 1
AIRCRAFT**

ELECTRICAL INSTALLATION

Prepared by direction of
the Ministry of Aviation

W. Shatto

Promulgated by Command
of the Air Council

H. J. Dean.

AIR MINISTRY

AMENDMENT RECORD SHEET

Incorporation of an Amendment List In this publication is to be recorded by signing in the appropriate column and inserting the date of making the amendments

A.L. No.	Amended by	Date
1	H. Duke	MAY 1955
2	J. Killyjohn	18.6.55
3	H. Chand	13/6/55
4	H. Longstaff	10.4.56
5	H. Chand	13/10/55
6	H. Chand	27/11/55
7	J. Killyjohn	18.6.55
8	M. W. F.	5/10/55
9	M. W. F.	3-1-56
10	H. Chand	25/1/56
11	H. Chand	25/1/56
12	T. W. F.	10/12/55
13	H. W. F.	
14	H. Chand	5.6.56
15	H. Chand	
16	H. W. F.	1/7/57
17	G. F. F.	6.5.58
18	H. W. F.	6.4.56
19	H. W. F.	27/2/57
20	H. W. F.	3/2/58
21	H. W. F.	6/7/57
22	S. B. F.	26/2/58
23	H. W. F.	3/2/58
24	H. W. F.	3/7/59

A.L. No.	Amended by	Date
25	H. W. F.	22/10/57
26	M. W. F.	10/10/57
27	H. Chand	30/1/58
28	H. Chand	30.6.59
29	H. Chand	3/7/59
30	H. Chand	20.5.59
31	H. Chand	11.12/59
32	H. Chand SAC	2/11/59
33	H. Chand SAC	5/5/60
34	H. Chand SAC	3/7/60
35	H. Chand SAC	22/6/60
36	H. Chand SAC	3/5/60
37	H. Chand SAC	3/5/60
38	A. Baxter	12.9.60
39	A. Baxter	21.7.60
40	A. Baxter	18.7.60
41	H. Chand SAC	3/5/60
42	H. Chand SAC	23/6/60
43	H. Chand SAC	27/6/60
44	A. Baxter	6-7-60
45	A. Baxter	27.7.60
46	A. Baxter	25.11.60
47	A. Baxter	11.11.60
48	B. Wharton	9.3.61

A.L. No.	Amended by	Date
49	A. Baxter	21-12-60
50	A. Baxter	21-12-60
51	A. Baxter	20-2-61
52	A. Baxter	17-1-61
53	A. Baxter	21-12-60
54	A. Baxter	21-12-60
55	A. Baxter	21-12-60
56	W.A. Buta	3.3.61
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61	A. Baxter	21-12-60
62	H. Chand SAC	24.6.63
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67	H. Chand SAC	24.6.63
68	H. Chand SAC	7-1-63
69	H. Chand SAC	12-11-62
70	H. Chand SAC	16.2.63
71	H. Chand SAC	24.6.63
72	E. Murphy	

(Continued overleaf)

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A.L. No.	Amended by	Date
73	<i>J.R. Lawry</i>	<i>26.8.63</i>
74	<i>[Signature]</i>	<i>14.8.64</i>
75	<i>K.W. Chapman</i>	<i>11.5.44</i>
76	<i>K.W. Chapman</i>	<i>11.1.65</i>
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WARNING

EJECTION SEAT

1. An ejection seat is a potential danger to personnel and aircraft. If the firing mechanism is inadvertently operated while the aircraft is on the ground the seat will be ejected, serious injury (possibly fatal) may be caused to any person in or leaning into the cabin and damage will be done to the aircraft.

2. The following instruction must therefore be obeyed implicitly :—

BEFORE ATTEMPTING TO ENTER THE CABIN REPORT TO THE N.C.O. IMMEDIATELY IN CHARGE OF AIRCRAFT SERVICING (R.A.F.), OR TO THE ORDNANCE SUPERVISORY RATING (R.N.), WHO WILL ENSURE THAT THE SEAT IS SAFE FOR THE PURPOSE REQUIRED.

3. Full instructions for rendering the seat safe are contained in the A.P.4288 series, in A.D.5037, and in the A.D.6038 series.

4. Voltages in excess of 100 volts either a.c. or d.c. can be dangerous under certain circumstances. Personnel should therefore ensure that the electrical system is electrically safe before any servicing is attempted. Where it is essential that tests or adjustments are to be made with the electrical power switched on, the greatest care must be exercised.

5. METHYL BROMIDE. Odourless non-irritant vapour highly poisonous. The effects may not be apparent at once and may be fatal if a large amount is inhaled before signs develop.

6. HIGH ENERGY IGNITORS. The energy stored in the capacitors of the high energy ignitors units can under certain circumstances be of a lethal nature. No servicing should be attempted until at least one minute has elapsed after disconnection of the L.T. supply to the input plug.

7. BOMB DOORS. It is important to note that even though the ISOLATOR switches are at ISOLATE and the TRIP SWITCH at NORMAL the doors WILL operate if the JETTISON switch be placed to JETTISON.

NOTE TO READERS

The subject matter of this publication may be affected by Air Ministry Orders or by "General Orders and Modifications" leaflets in this A.P., in the Associated publications listed below, or even in some others. If possible, Amendment Lists are issued to correct this publication accordingly, but it is not always practicable to do so. When an Order or leaflet contradicts any portion of this publication, the Order or leaflet is to be taken as the overriding authority.

The inclusion of references to items of equipment does not constitute authority for demanding the items.

Each leaf bears the date of issue and, when applicable, the number of the Amendment List with which it was issued. New or amended technical information on new leaves which are inserted when this publication is amended will be indicated by solid triangles in the text. The triangles are placed thus ◀ . . . ▶ to show the extent of amended matter and thus ▶◀ to show where text has been deleted. When a Section or Chapter is issued in a completely revised form, the triangles will not appear.

This Volume 1 is issued in three covers, and if more than one copy of the publication is held, each set of covers should be given a copy number and kept together.



LIST OF ASSOCIATED AIR PUBLICATIONS AND DIAGRAMS

	<i>A.P.</i>		<i>A.D.</i>
◀ Aircraft refuelling equipment	.... 4511	Auto-pilot installation	.... 6565
Aircraft refuelling in flight	.... 4611 ▶	Emergency equipment	.... 5612
Aircraft wheels, tyres and brakes	.... 2337	Canopy jettison system and elevator disconnection	.... 5613
Avon Mk. 20101 series engine change unit	.... 4481A & D	Undercarriage actuation and locks	.... 5614
Ejection seats R.A.F. aircraft, Mk. 3 series	.... 4288C	E.C.U. Installation connections	.... 5616
Hydraulic equipment, aircraft, Vickers	.... 1803N	◀ E.C.U. Oil circulation and gear trains	.... 6044
Pressurizing and air-conditioning equipment, aircraft	.... 4340	E.C.U. fuel system	.... 6041
Safety equipment	.... 1182	E.C.U. servicing information	.... 6042 ▶
	<i>A.D.</i>	Lubrication	.... 5618
Fuel system	.... 5601	Electrical installation B Mk. 1	.... 6359
Hydraulic system	.... 5603	Electrical installation B|PR Mk. 1	.... 6514
De-icing systems	.... 5605	Electrical Installation B|K Mk. 1	.... 6572
Cabin heating, ventilating and pressurizing systems 5606	◀ Electrical installation B K PR Mk. 1 6576 ▶
Fire extinguisher system 5608	Bomb gear installation 5620
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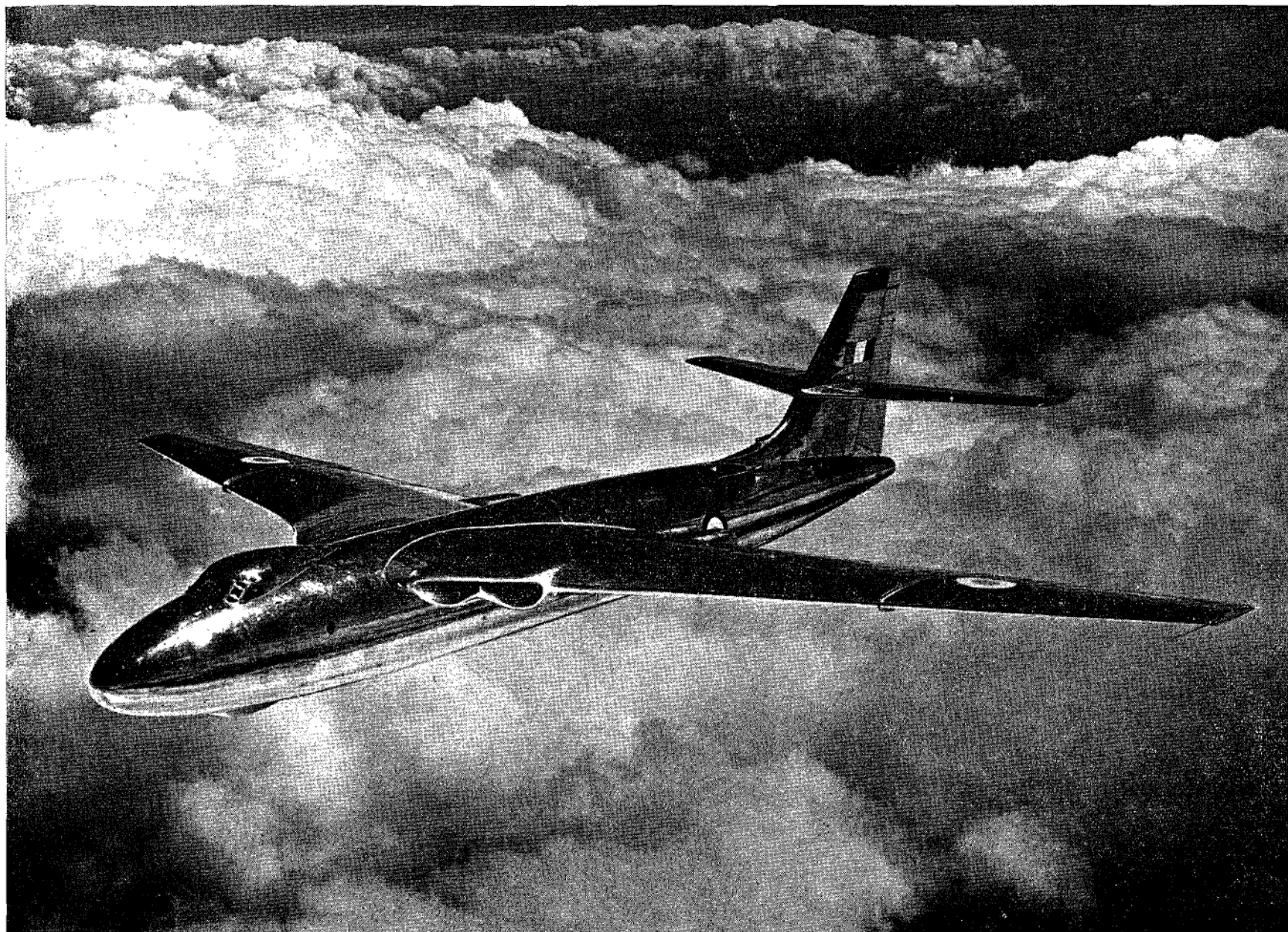
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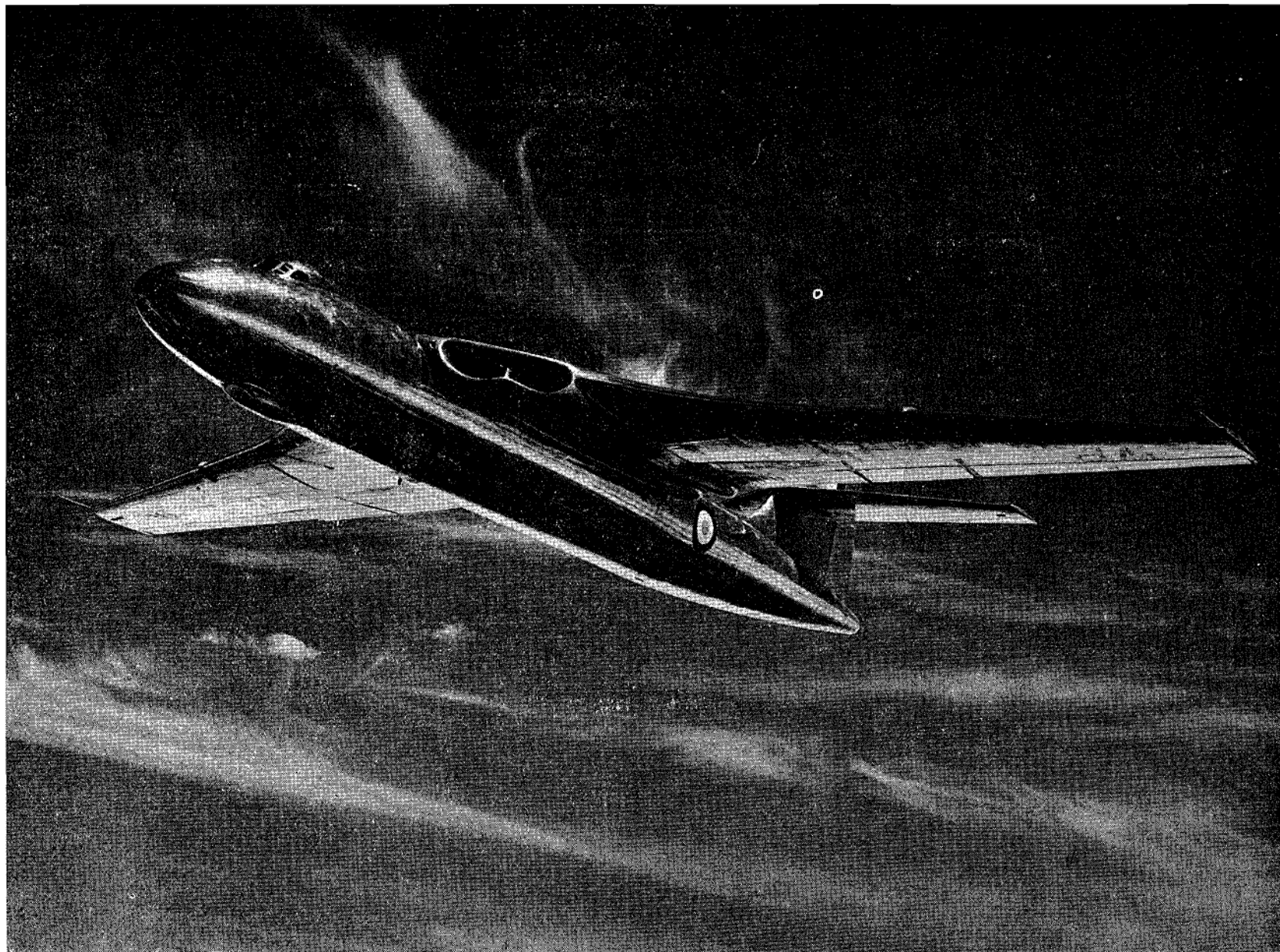
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INTRODUCTION

The VALIANT aircraft is a high-wing monoplane of all-metal, stressed-skin construction. It is powered by four Rolls-Royce R.A.14 Avon turbo-jet engines and, basically, is a bomber, but certain aircraft are convertible to photographic reconnaissance or refuelling-in-flight roles. The crew of five, first and second pilot, two navigators and a wireless operator, are accommodated in a pressure cabin; the two navigators share the bomb-aiming and camera control duties. Ejection seats are fitted for both pilots.

The fuselage is divided into three sections, the nose fairing, the pressure cabin and the main fuselage. With the exception of the nose fairing the structure is of high-tensile, light-alloy, stressed skin construction, flush-riveted externally. The skin plating is reinforced by closely spaced longitudinal stringers of lipped Z-section and bulb angle, and supported on lipped channel-section open frames. Only the stringers are attached to the skin, the frames being inside the stringers, to which they are cleated. Heavier built-up frames are provided in the region of the wing spar and tail unit attachments. The fuselage is of circular section throughout except for the slight blisters formed by the jettisonable canopy and the fairing in the region of the bomb-aimer's window.

The pressure cabin is that portion of the fuselage containing the crew, their controls and associated equipment. Reinforced bulkheads form the fore and aft boundaries respectively, the front bulkhead being convex and the rear concave. An elliptical door gives entry to the cabin on the port side, and, with a hinged windshield forms

the parachute exit. An elliptical window is provided on each side of the cabin, that on the starboard side being built into a crash exit. The sextant dome can be pulled in to form an emergency exit.

The main portion of the fuselage contains the nose wheel bay, the servicing bay, the rear bay, the bomb compartment, and the fuel tank bay. The fuel tank bay is above the bomb compartment, and, when the tanks are in position, has no means of entry.

The main plane is a cantilever, stressed-skin structure, swept back in two stages, the inner plane and the outer plane, the intersection of the two being faired in thermal de-icing ducts are provided along the leading edge.

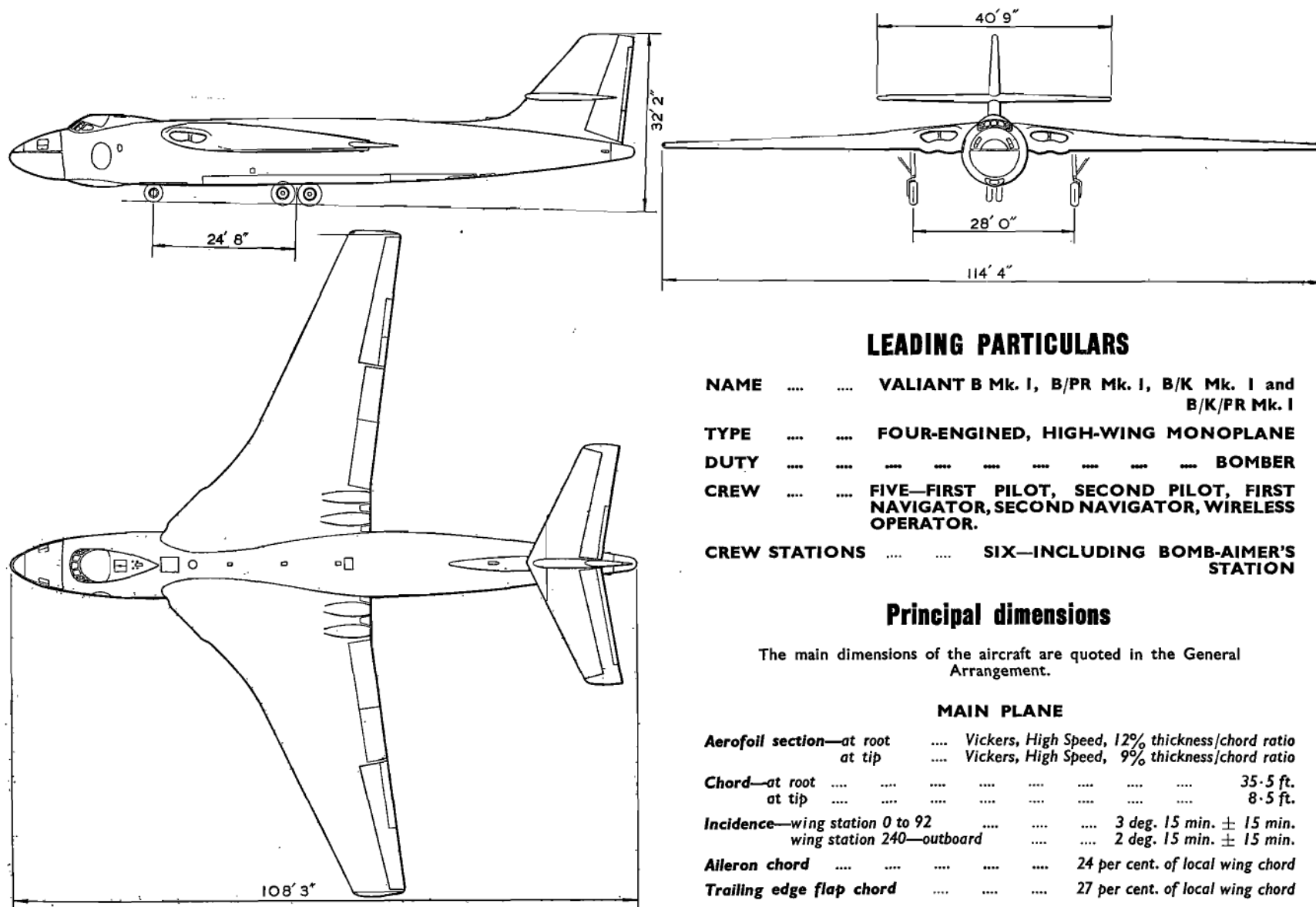
The inner plane, which carries the power plants, is of very short span; the two spars front and rear, are virtually built integral with the fuselage, the port and starboard spars being jointed at the centre line of the fuselage by a fork joint and taper bolts. Flaps are fitted at the trailing edge and form part of the jet pipe outlets.

The outward-retracting main undercarriage units and the wing fuel tanks are carried in the outer planes and provision is made for carrying underwing tanks or stores. Slotted trailing-edge flaps are fitted from the inboard ends of the outer planes to the sealed, internally balanced ailerons which extend to the detachable wing tip. Dive brakes on the bottom surface extend across the inner half of the flap span.

The tail unit is of stressed-skin construction, and consists of a fin and rudder and a swept-back, variable-incidence tail plane to which conventional balanced elevators are fitted. The fin has a considerable dorsal extension forward and the rudder hinge line slopes backwards to the top. The tail plane is mounted high on the fin so as to be well above the jet streams. The leading edges of the fin and tail plane are equipped with thermal de-icing ducts, and the junction of the fin and tail plane is faired in.

The tricycle undercarriage consists of two main wheel units mounted in the outer planes, and a steerable nose wheel unit mounted in the fuselage just aft of the pressure cabin; each unit is lowered and retracted by an electric actuator, and when in the retracted position is totally enclosed by automatically-operated doors. The main wheel units each comprise two wheels supported by shock-absorber struts mounted in tandem and the nose wheel unit comprises twin wheels mounted on an axle which is supported centrally by a single shock-absorber strut. The nose wheel steering and main wheel braking are effected by electro-hydraulic power.

Side-by-side dual controls are fitted; the aileron, elevator and rudder circuits each incorporate, in a system of rigid push-pull rods, a power control unit and an artificial feel unit. In the event of the power supply failing, reversion to manual operation is automatic. When the canopy is jettisoned, the elevator controls are disengaged from the hand wheel, which is thrown forward to clear the pilot's legs when he is ejected.



General arrangement

LEADING PARTICULARS

NAME VALIANT B Mk. I, B/PR Mk. I, B/K Mk. I and B/K/PR Mk. I
 TYPE FOUR-ENGINE, HIGH-WING MONOPLANE
 DUTY BOMBER
 CREW FIVE—FIRST PILOT, SECOND PILOT, FIRST NAVIGATOR, SECOND NAVIGATOR, WIRELESS OPERATOR.
 CREW STATIONS SIX—INCLUDING BOMB-AIMER'S STATION

Principal dimensions

The main dimensions of the aircraft are quoted in the General Arrangement.

MAIN PLANE

Aerofoil section—at root Vickers, High Speed, 12% thickness/chord ratio
 at tip Vickers, High Speed, 9% thickness/chord ratio
Chord—at root 35.5 ft.
 at tip 8.5 ft.
Incidence—wing station 0 to 92 3 deg. 15 min. ± 15 min.
 wing station 240—outboard 2 deg. 15 min. ± 15 min.
Aileron chord 24 per cent. of local wing chord
Trailing edge flap chord 27 per cent. of local wing chord

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