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AIR PUBLICATION

101B-1901-1A

(Formerly A.P.4505 A & C, Vol.1, Book 1)

**VULCAN B Mk.1 AND B Mk.1A
AIRCRAFT**

AIRCRAFT SERVICING MANUAL

BY COMMAND OF THE DEFENCE COUNCIL

L. T. Dunnett

Ministry of Defence

FOR USE IN THE ROYAL AIR FORCE

(Prepared by the Ministry of Aviation)

Issued with A.L.132, Apr.67.

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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

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1	M. E Cook	1-5-56
2	M E Cook	1-5-56
3	b. flour	8-5-56
4	b. flour	15-5-56
5	M E Cook	1-5-56
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LETHAL WARNING

EJECTION SEATS AND CANOPY JETTISON MECHANISMS

1. Ejection seats and canopy jettison mechanisms are sources of potential danger to personnel and of damage to the aircraft. Serious injury (possibly fatal) may result if any firing mechanisms are inadvertently operated whilst the aircraft is on the ground.

2. The following instructions are to be obeyed:-

R.N. Safety precautions contained in A.P.(N) 140 - Naval Aircraft Maintenance Manual.

R.A.F. ALL PERSONNEL before entering the cockpit or cabin of an aircraft fitted with an ejection seat are to report to the N.C.O. immediately in charge of airframe servicing who is to ensure that all safety pins (or other safety devices) are correctly positioned to render the seat and canopy jettison firing mechanism safe. On completion of servicing, tradesmen are to report to the N.C.O.

3. Full instructions for rendering the firing mechanisms safe are contained in the A.P.4288 and A.P.(N) 1023 series, in Aircraft Servicing Schedules and in the A.P.5037 series.

ELECTRICAL SYSTEM

VOLTAGES IN EXCESS OF 100 VOLTS, EITHER A.C. OR D.C. CAN BE DANGEROUS UNDER CERTAIN CIRCUMSTANCES. PERSONNEL MUST THEREFORE ENSURE THAT THE ELECTRICAL SYSTEM IS ELECTRICALLY SAFE BEFORE ANY SERVICING IS ATTEMPTED. WHERE IT IS ESSENTIAL THAT TESTS OR ADJUSTMENTS BE MADE WITH THE ELECTRICAL POWER SWITCHED 'ON' THE GREATEST CARE MUST BE EXERCISED.

HIGH-ENERGY IGNITION UNITS

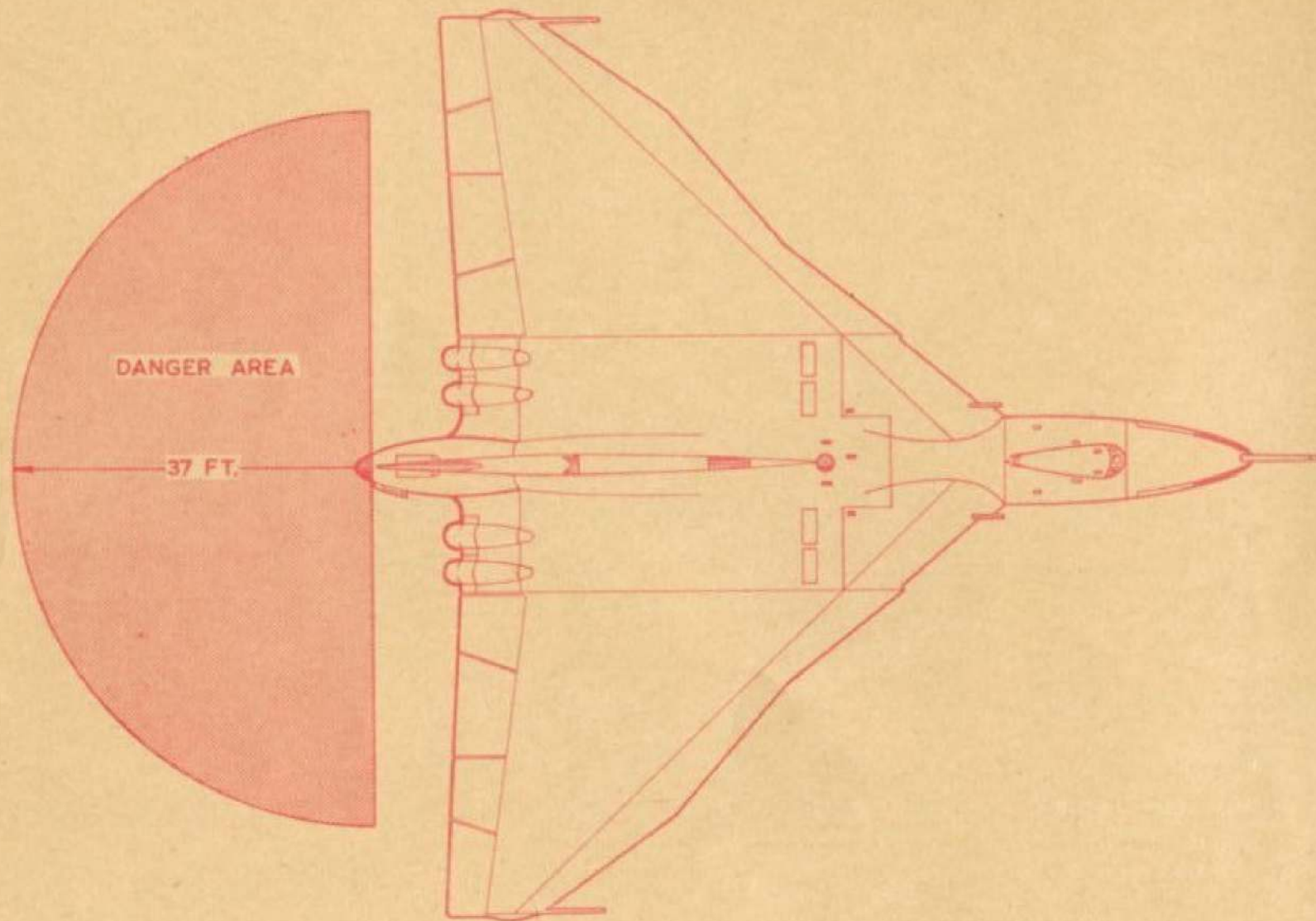
THE ENERGY STORED IN THE CAPACITORS OF THE HIGH-ENERGY IGNITION UNITS CAN, UNDER CERTAIN CIRCUMSTANCES BE OF A LETHAL NATURE. NO SERVICING IS TO BE ATTEMPTED UNTIL AT LEAST ONE MINUTE HAS ELAPSED FROM THE DISCONNECTION OF THE L.T. INPUT PLUG.

MICRO WAVE RADIATION

There is a MICRO WAVE RADIATION HAZARD from certain equipment in the Vulcan B Mk.1A aircraft. To avoid injury to health, all personnel are to keep clear of the area indicated on the illustration overleaf. The area is to be roped off and notices displayed warning personnel to KEEP CLEAR.

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WARNING



Microwave radiation hazard

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NOTE TO READERS

The subject matter of this publication may be affected by Defence Council Instructions, or by Servicing Schedules (Vol.4), or General Orders and Modification 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 Instruction, Servicing Schedule or leaflet contradicts any portion of this publication, the Instruction, Servicing Schedule 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, except the original issue of preliminaries, bears the date of issue and number of the Amendment List with which it

was issued. New or amended technical matter will be indicated by triangles positioned in the text thus: - ◀-----▶ to show the extent of amended text, 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.

If more than one copy of this publication is held, each set of covers should be given an identifying number and be kept together.

◀ The reference number of this publication was altered from A.P. 4505A & C to A.P.101B-1901 in April 1967. No general revision of page captions has been undertaken, but the code number appears in place of the earlier A.P. reference on new or amended leaves issued subsequent to that date. ▶

LIST OF ASSOCIATED PUBLICATIONS

	A.P.
<i>Aircraft automatic stabilizers</i>	1469S
<i>Aircraft fuel and oil tanks</i>	4117
<i>Aircraft pneumatic equipment</i>	4303
<i>Aircraft pressure fuelling equipment</i>	4511
<i>Aircraft pressurizing and air conditioning equipment</i>	4340
<i>Aircraft undercarriage equipment Dowty Rotal</i>	1803V
<i>Aircraft undercarriage equipment Dowty</i>	1803E
<i>Aircraft wheels, tyres and brakes</i>	2337
<i>Bomb and supply carriers and associated equipment</i>	1664 series
<i>Data book on safety and survival equipment and flying clothing</i>	4380
<i>Dunlop equipment fitted to Vulcan aircraft</i>	4515C
<i>Ejection seats and escape equipment</i>	4288C
<i>Electrical Manual</i>	4343 series
<i>Hydraulic equipment - Dowty</i>	1803D
<i>Instrument manual</i>	1275 series
<i>Missile storage, preparation, transportation, loading and off-loading procedures</i>	2852B
<i>Olympus 101, 102 and 104</i>	4501B, C & E
<i>Powered flying control units and equipment</i>	4603C, D & E
<i>Servicing trolleys</i>	2306 series

AIR DIAGRAMS

	A.D.
<i>Access panels</i>	6022Q
<i>Cabin and aircraft pressurization</i>	6022V
<i>De-icing systems</i>	6022D
<i>E.C.U. installation</i>	6022G
<i>Emergency installations</i>	6022N
<i>Fire extinguishing systems</i>	6022M
<i>Flying controls and lubrication</i>	6022C
<i>Fuel system</i>	6022F
<i>Hydraulic system</i>	6022H
<i>Jet efflux - danger areas</i>	6022X
<i>Lubrication</i>	6022B
<i>Pneumatic system</i>	6022P
<i>Vulcan aircraft escape drill</i>	5558

LAYOUT OF A.P. 101B - 1901

VULCAN B. MK.1 AND B MK.1A AIRCRAFT

Code	Title	Previous designation
101B-1901-1	Aircraft servicing manual	A.P.4505 A & C, Vol.1
<i>Issued in three books as follows:-</i>		
101B-1901-1A	Sect.1 to 4	A.P.4505 A & C, Vol.1, Book 1
101B-1901-1B	Sect.5, Chap.1	A.P.4505 A & C, Vol.1, Book 2
101B-1901-1C	Sect.5, Chap.2, Sect.6 and 7	A.P.4505 A & C, Vol.1, Book 3
101B-1901-2	General orders	A.P.4505 A & C, Vol.2
101B-1901-3A	Illustrated parts catalogue	A.P.4505 A & C, Vol.3, Part 1
101B-1901-3B	Appendix 'A'	A.P.4505 A & C, Vol.3, Part 2
101B-1901-3C	Scales of unit equipment	A.P.4505 A & C, Vol.3, Part 3
101B-1901-3D	Scales of servicing spares	A.P.4505 A & C, Vol.3, Part 4
101B-1901-4	Planned servicing schedule	A.P.4505 A & C, Vol.4
101B-1901-5	Not applicable	A.P.4505 A & C, Vol.5
101B-1901-6A	Aircraft repair manual	A.P.4505, Vol.6
101B-1901-7	Modifications list	A.P.4505 A & C, M.L.
101B-1901-12	Ground handling notes	A.P.4505 A & C, G.H.N.
101B-1901-15A	Pilot's notes, Mk.1	A.P.4505A - P.N.
101B-1901-15B	Pilot's notes, Mk.1A	A.P.4505C - P.N.
101B-1901-16	Operating data manual	A.P.4505 A & C - O.D.

NOTE . . .

Until notice of the changeover is promulgated in D.C.I.'s the required A.P. should be requisitioned under the old A.P. number.

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	" 2A - Controls and equipment at crew stations (Mk.1A)
	" 3 - Emergency controls, equipment and exits - method of operation
Section 2 - Ground Handling and Preparation for Flight	Chapter 1 - Ground handling
	" 2 - Preparation for flight (Mk.1)
	" 2A - Preparation for flight (Mk.1A)
	" 3 - Loading and C.G. data (Mk.1)
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	" 6 - Nitrogen system and fuel tank pressurisation (Mk.1)
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	" 7 - Rocket engine assisted take-off unit

LUBRICATION SYMBOLS

The following symbols and abbreviations are used to indicate lubrication on the appropriate illustrations throughout the book.

<i>Symbol</i>	<i>Lubricant</i>	<i>Ref. No.</i>	<i>N.A.T.O. Code No.</i>	
	Grease XG-295	34B/9423152	G-352	
	Grease XG-277	34B/9100514	G-359	
	Grease ZX-28	34B/9437518	-	
	{	Oil OX-14	34B/9100589 (2 oz.)	0-147
		Oil OX-14	34B/9100590 (½ pt.)	0-147
		Oil OX-16	34B/9423149	-
		Gun lubrication	-	-
		Pre-packed bearings	-	-

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INTRODUCTION



VULCAN B Mk. 1 AIRCRAFT

1. The VULCAN B Mk. 1 aircraft is a four-engined, all-metal monoplane of delta planform and is powered by Olympus turbo-jet engines. It has medium range, a fast cruising speed and a high operational ceiling and is equipped to carry an extensively variable bomb load.

2. The VULCAN B Mk. 1A aircraft is basically a Mk. 1 aircraft with extended wing tips, a modified aileron control circuit, modified rudder, and an extended and enlarged rear fuselage which accommodates additional airborne equipment. Slung below the starboard centre engine rib and between the jet pipe curvatures are honeycomb construction counterpoise plates which are also part of the additional airborne equipment. General

F.S./1

information, additional to that provided in the introduction for Mk. 1 aircraft, follows.

3. Mounted in the rear fuselage of B/K Mk. 1A aircraft are canisters, part of the additional airborne equipment, water/glycol and vapour cycle heat control systems for the temperature control of the canisters, and pneumatic and cooling systems for the rear warning unit which forms the tail cone of the rear fuselage. Access to this equipment is through three access doors in the bottom of the centre section of the rear fuselage.

4. The additional airborne equipment in Mk. 1A aircraft requires power supplies at 200-volts, 400 c/s 3 phase A.C. and 28 volts D.C. The A.C. supply is from a turbine driven 30-k. V.A. alternator in a compartment aft of the starboard undercarriage bay

and the D.C. supply from the aircraft bus-bar via suitable fuse banks on the distribution panel. A socket for a 200-volt A.C. ground supply is situated on the starboard underside of the rear fuselage. ▶

5. The FUSELAGE of both Mk. 1 aircraft is manufactured in four separate sections, is a light-alloy, stressed-skin structure of circular cross-section and incorporates transverse formers braced by longitudinal stringers together with two fabricated ribs which form the support for the arch-shaped formers of the bomb bay. The sections are:—

(1) Nose fairing—the upper portion of which is of orthodox metal construction and houses flight refuelling equipment. Below the metal portion is a dielectric

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structure of fibre glass and expanded rubber which constitutes the radome.

(2) Front section—constituting the crew's pressurised compartment.

(3) Centre section—which is integral with the main plane and extends from the rear bulkhead of the crew's compartment to a point aft of the rear spar. Four fuel tanks are housed in the forward end, the remainder forming an extensive bomb compartment. Below this section is a pair of bomb doors which, when opened, fold upwards inside the bomb compartment to minimise drag. Twin, side-by-side engines are mounted in each side of the main plane portion, the latter also containing the air brakes and jet pipes.

(4) Rear section—which embodies the rear supports and outlets for the jet pipes and houses a cone-shaped fairing at its aft end.

6. SEATS for five crew members are all located in the pressurised cabin in the forward end of the fuselage, and a prone-lying air-bomber's station is provided in a blister below the cabin.

7. The ENTRANCE DOOR, situated in the lower side of the fuselage nose, aft of the air bomber's blister and below the crew's compartment, opens downwards. Entry is by means of a folding ladder which is secured to the inside of the door. A further ladder provides access to the pilots' floor. Manually and pneumatically-operated door mechanisms are fitted, the latter being used to open the door for an emergency exit, in flight, against the force of the airstream.

8. A SWEPT-BACK DORSAL FIN and RUDDER, covered with light-alloy sheet plating, are mounted on the rear of the fuselage. To improve directional stability, the fin fairing is considerably extended along the fuselage.

9. The TWO-SPAR MAIN PLANE consists of a centre section, integral with the fuselage, and port and starboard outer wings. To delay

the onset of compressibility, the wings have a pronounced sweep back on the leading edges; the trailing edges also have a slight sweep back. The complete main plane, which has sufficient depth at the roots to accommodate the power units and alighting gear, tapers in plan and elevation to the wing tips. Skin covering is of light-alloy throughout. Ten compartments are provided, five in each outer wing, to accommodate bag-type flexible fuel tanks.

10. CONTROL SURFACES consist of elevators and ailerons, divided into half sections, and a rudder. Both ailerons and elevators are aerodynamically balanced and all control surface leading edges are sealed with rubberised fabric sheeting to the main plane or fin to provide internal balances which relieve the control operating loads. Each section of the elevators and ailerons is operated independently by a separate electro-hydraulic power unit, two further power units being provided for the rudder. In the absence of a conventional tail unit, the elevators are mounted in the outer wings and extend from the centre-section wing transport joint to a main hinge rib slightly more than half-way along the wing trailing edge; the ailerons extend outboard from this rib to the wing tips. Electrically-operated, rotating-slat-type air brakes are mounted in the main plane above and below the engine air intakes.

11. The DUAL FLYING CONTROLS comprise parallel-motion-type rudder pedals and single-grip-type control columns. The latter are moved fore-and-aft in mountings on the underside of the main instrument panel to control the elevators and are turned laterally, as a normal fighter stick, to control the ailerons. The rudder pedals incorporate foot brakes and control the nose-wheel steering when the aircraft is moved on the ground. Push-pull control tubes are used throughout from the cockpit controls to electro-hydraulic power units actuating each control surface. Due to the use of the power units the pilots' control grips and rudder pedals are not sensitive to control surface loads: spring-loaded artificial feel units are therefore employed to simulate the loading. The

spring loading is adjustable to trim the aircraft for straight and level flying.

12. The ALIGHTING GEAR, which is retractable, consists of two main-wheel units, each unit being a liquid-spring shock-absorber fitted with a four-wheeled, eight-tyred bogie, and a steerable nose-wheel unit fitted with twin wheels. The main-wheel units are retracted forward and upward into their main plane housing, outboard of the power units, by hydraulic jacks. The nose-wheel unit is retracted with a single jack, upward and backward, into the fuselage nose. When retracted the main wheels are completely faired in by hydraulically-operated doors and a fairing mechanically coupled to the shock-absorber strut. Two self-locking, hydraulically-operated doors fair the nose wheel unit to the fuselage nose.

13. The HYDRAULIC SYSTEM is electrically controlled and operates the alighting gear, bomb doors, wheel brakes and nose-wheel steering. A reserve pressure supply for the brakes is retained by two accumulators charged from the main hydraulic system; an electro-hydraulic power pack is available for the emergency operation of the bomb doors and to recharge the brake system when the hydraulic pumps are not operating.

14. A COMPRESSED AIR SYSTEM is installed to lower the alighting gear in an emergency. A further compressed air system is provided to open or close the main entrance door and also to initiate jettisoning of the canopy.

15. CABIN AIR CONDITIONING is effected by an air conditioning unit, utilising hot air from the engines, which governs the pressure and temperature in the crew's compartment. Pressure, equivalent to heights of 8,000 ft. or 25,000 ft., and the air temperature, can be maintained automatically as desired; the temperature can also be regulated manually. An oxygen system is provided for use when the pressure equivalent of 25,000 ft. is selected.

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16. DE-ICING is accomplished by circulating hot air, extracted from the engine, through ducting in the leading edges of the wings and fin. Further systems utilising de-icing fluid, are provided for the pilots' and air bomber's windscreens.

17. The OLYMPUS turbo-jet engines are housed in pairs, inside the centre section, between the front and rear spars, and are bounded by the bomb-bay rib and the centre section/wing transport rib. The jet pipes are underslung, and emerge from the centre section to extend slightly beyond the trailing edge. Engine controls are grouped forward of the pilots' centre console and the engine starting and electrical controls are on the port console.

18. FUEL is supplied by an electrically operated low-pressure pump, in the base of each tank, directly to the high pressure pumps. Automatic electrical control of fuel delivery from each tank is provided to maintain a static C of G position during flight. In addition, the No.1 and No.7 tanks each have a transfer pump which can be used to balance the fuel load should the aircraft become nose or tail heavy. Normally the engines on one side are supplied from the tanks on that side, No.1, 4, 5 and 7 tanks feeding into a single pipe line to supply the outboard engine and No.2, 3 and 6 tanks supplying the inboard engine. An aircraft cross-feed cock, and an engine cross-feed cock between each pair of engines, are provided, by use of which fuel can be fed

from any particular tank or tank group to all four engines. A pressure system is provided for flight and ground refuelling. Distribution of fuel load amongst all the tanks to ensure correct aircraft loading is controlled automatically during ground refuelling and manually during flight refuelling.

19. FIRE PROTECTION consists of two separate methyl-bromide installations, one for the engines and the other for the airframe. A system for introducing nitrogen into tanks is provided, the nitrogen also being utilised for pressurising the tanks. A nitrogen purging system protects the flight refuelling system. Post Mod.171 explosion protection is introduced into the fuel tanks.

20. POWER for the electrical services and for the d.c. sections of the radio and radar services is supplied by four 112-volt, 22½ Kw. generators. Each generator is controlled by its associated voltage regulator and stable parallel operation is ensured through an equalisation circuit. In addition to supplying power for the services, the generators charge four 24-volt, 40 amp-hr. batteries, which are connected in series to the 112-volt bus-bar; a fifth similar battery is connected to the 28-volt bus-bar, and is charged from three 112/28 volt d.c. rotary transformers. Rotary inverters supply a.c. power for the radar equipment, flight instruments and autopilot. Overload protection is afforded by thermal circuit breakers and reverse current flow to the generators by differ-

ential relays operating contactors. A single-pole earth-return wiring system utilising the aircraft structure is employed. No aircraft master switch is provided since, with engines stopped, only the 28-volt battery is connected to the bus-bar, this battery can be isolated by the switch on the panel adjacent to the signaller's station. Two external supply sockets facilitate the connection of ground supplies for starting and testing purposes. Electrical control is employed for cabin-conditioning equipment, air-brakes, flying control power units, bomb release gear, fuel system and ancillary equipment.

21. LIGHTING in the crew's cabin consists of ultra-violet auxiliary red and emergency white for the pilots, red and white lighting for the crew, together with cabin and angle-poise units. Lighting to assist servicing personnel is provided in the nose-wheel and main-wheel bays, in the bomb compartment, in the compartment aft of the bomb bay and in the compartment below the fin post.

22. EMERGENCY EQUIPMENT includes ejection seats for the first and second pilots, an M.S.5 Mk.1 dinghy with survival equipment, a signal pistol, first aid outfits, fire axes, asbestos gloves and hand-operated fire extinguishers. Portable oxygen supplies are also provided for each crew member when abandoning the aircraft.

23. WIRELESS AND RADAR EQUIPMENT are detailed in Book 2 and 3 of this Air Publication.

LEADING PARTICULARS

NAME	...	...	...	...	...	...	...	...	VULCAN B MK.1
TYPE	...	...	...	...	...	...	...	...	DELTA WING MONOPLANE
DUTY	...	...	...	...	...	...	...	...	HIGH ALTITUDE MEDIUM BOMBER
CREW	...	...	...	...	...	...	...	...	FIVE INCLUDING TWO PILOTS

GENERAL DATA AND CONTROL SURFACE AREAS

For main aircraft dimensions refer to Fig.1 - General Arrangement Mk.1 aircraft. For the settings and range of movement of control surfaces refer to Sect.3, Chap.4.

Main plane data	
Aerofoil section at root	... .. N.A.C.A.0010
Aerofoil section at wing tip ..	Modified R.A.E.101, 6.7 per cent
Chord (mean) standard	... .. 40.238 ft.
Chord at wing tip	... .. 8.16 ft.
Chord, root	... .. 63.40 ft.
Incidence	... .. 5 deg.
Dihedral	... .. 0 deg.
Sweepback - leading edge	... .. 49 deg. 54 min.
Elevators, mean chord (aft of hinge line)	
Inboard	... .. 6.552 ft.
Outboard	... .. 6.097 ft.
Ailerons, mean chord (aft of hinge line)	
Inboard	... .. 4.263 ft.
Outboard	... .. 3.497 ft.
Main plane areas (in.sq.ft.)	
Main plane including elevators and ailerons (gross) from aircraft centre line...	... .. 3,554
(net) excluding fuselage	... .. 2,974
Elevators (aft of hinge line)	
Inboard, each	... .. 63.8
Outboard, each	... .. 56.4
Total (effective area)	... .. 240.4
Ailerons (aft of hinge line)	
Inboard, each	... .. 32.2
Outboard, each	... .. 32.5
Gross, port and starboard	... .. 129.4
Fin and rudder data	
Fin sweepback, leading edge	... .. 49 deg.30 min.
Fin sweepback, trailing edge	... .. 25 deg.30 min.
Areas (in sq.ft.)	
Fin, gross	... .. 261.065
net (effective area)	... .. 160.065
Rudder (aft of hinge line)	... .. 63.395
Total, gross	... .. 325
net (effective area)	... .. 224

ALIGHTING GEAR

Main-wheel units

Type

Two forward retracting units with four wheeled, eight-tyred bogies and single shock-absorber strut. Dowty Part No.2.00029.017(port) 2.00029.018 (starboard).

Retracting strut

assembly ... A.7558Y Mk.A (port), A.7558Y Mk.B (starboard)

Jack strut

assembly ... 1.01295.003 (port), 1.01295.004 (starboard)

Shock-absorber strut

Type Liquid spring, 0.8486Y B.01

Oil OX-16 (Ref.No.34B/9423149)

Wheels

Tyres AH.9982/13

DR.0098

GA.3225 (Ref.No.27A/3377)

ZA.167

Inner tubes DT.0007/1 (Ref.No.27A/3526)

Brakes AH.51238, front port inner, front starboard outer

AH.51239, front port outer, front starboard inner

AH.51708, rear port inner, rear starboard outer

AH.51709, rear port outer, rear starboard inner

Working pressure 2,500 p.s.i.

Maxaret units

Type AC11512/7, front port outer, front starboard inner

AC11514/10, rear port outer, rear starboard inner

AC11516/10, rear port inner, rear starboard outer

AC11518/7, front port inner, front starboard outer

Nose-wheel unit

Type Rearward retracting, steerable, 2.00050.004

Shock-absorber strut

Type Dowty liquid spring

Fluid OX-16 (Ref.No.34B/9423149)

Retracting strut 2.00051.003

Wheels AH.9527

Tyres DC.4982, (Ref.No.27A/3523)

Inner tubes FE.3. (Ref.No.27A/3527)

POWER UNITS

Name Olympus 101, 102 or 104

Type Turbo-jet

RESTRICTED

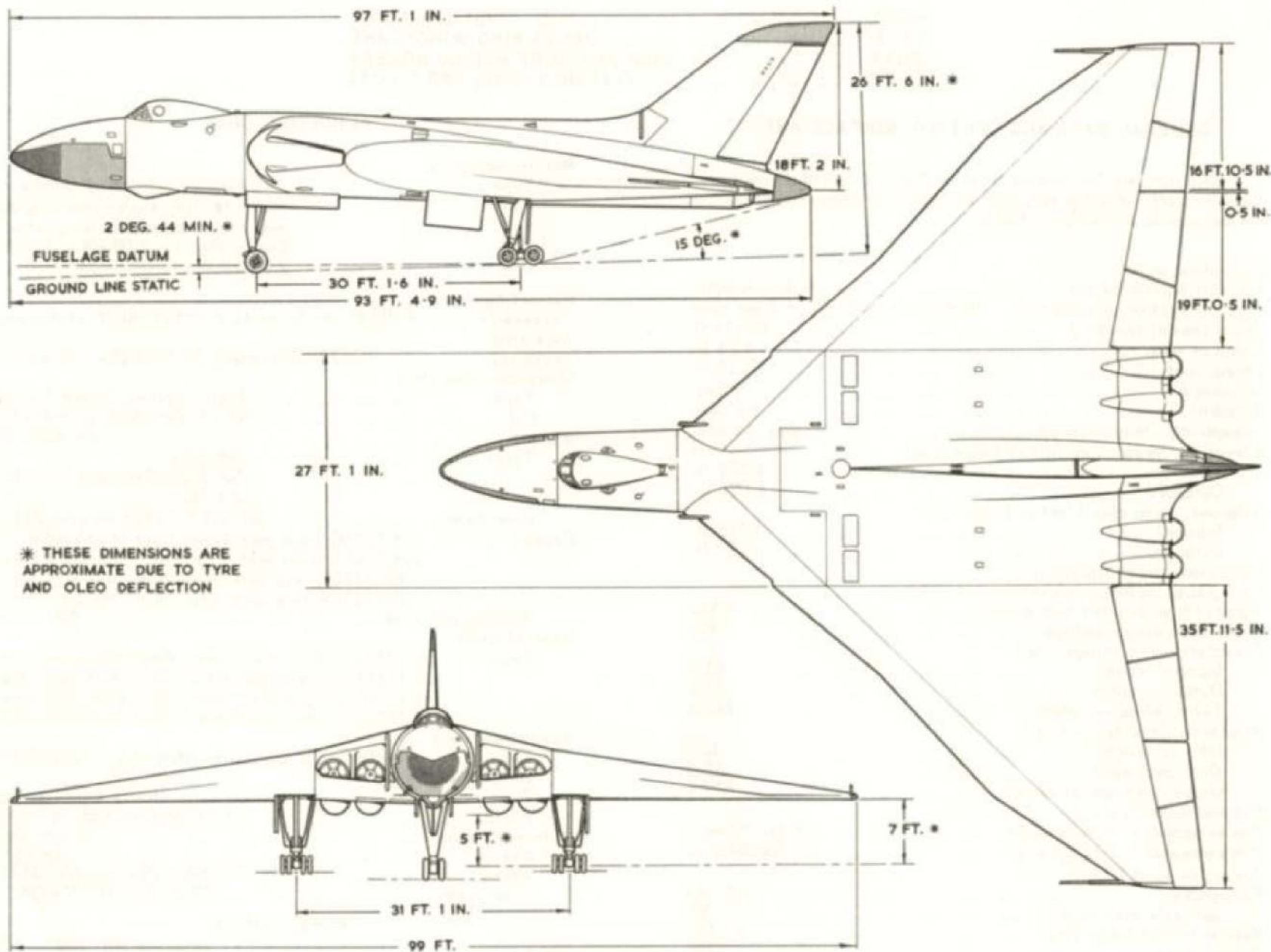


Fig. 1. General arrangement Mk. I aircraft.

RESTRICTED

Number	Four
Oil system	
Type	Integral with engine
Oil	OX-38 (Ref.No.34A/9100591, N.A.T.O. Code No.0-149)
Tank capacity	
Olympus 101	6 gall. oil, 4 gall. air space
Olympus 102	6.5 gall. oil, 3.5 gall. air space
Olympus 104	7 gall. oil, 3 gall. air space
Engine capacity	1 gall. (approx.)
Starting system	Electrical
Starter motor	Rotax C.8601 (Ref.No.37F/5502)
Engine-driven auxiliaries	
Hydraulic pumps	Dowty A8003Y/4000 (Ref.No.37J/8002)
Generators	22½Kw. Rotax Type 551 (Ref.No.5UA/7440) or Rotax Type 551A (Ref.No.5UA/7441)

FUEL SYSTEM

Fuel	A.V.T.A.G. (Ref.No.34A/9100448)
Fuel pumps, main	S.P.E.808, Mk.2
Fuel pumps, auxiliary	S.P.E.106, Mk.1
Fuel transfer pumps	B.P.8, Mk.4
Fuel low pressure warning switch setting	5 p.s.i.
Refuelling valves	F.R. Mk.40
Rate of flow	50 gall. per min.
Tanks	Fourteen

HYDRAULIC SYSTEM

Pumps	
Type	Dowty A8003Y/4000 (Ref.No.37J/8002)
Number	Three
Working pressure	3,600 p.s.i.
Off-load pressure	4,000 p.s.i.
Peak pressure	4,400 p.s.i.
Reservoir	Dowty A6785Y
Capacity (to filling level)	2¼ gall. (approx.)
Fluid	Oil OM-15 (Ref.No.34B/9100572; N.A.T.O. Code No.H-515)
System capacity	12 gall.

EMERGENCY AIR SYSTEM

Cylinders	Mk.5F (Ref.No.6D/9429887)
Number	Two
Charging pressure	3,000 p.s.i.
Capacity (each)	1,250 litres

PNEUMATIC SYSTEM - ENTRANCE DOOR

Cylinders	Mk.5F (Ref.No.6D/9429887)
Number	Two
Charging pressure	2,000 p.s.i.
Capacity (each)	1,250 litres

PNEUMATIC SYSTEM - H2S SCANNER

Cylinder	Mk.5D (Ref.No.6D/9429885)
Number	One
Charging pressure	1,800 p.s.i.
Capacity	750 litres

PNEUMATIC SYSTEM - T4 BOMBSIGHT

Cylinder	Mk.5D (Ref.No.6D/9429885)
Number	One
Charging pressure	2,000 p.s.i.
Capacity	750 litres

AIR CONDITIONING SYSTEM

Turbine unit	
Type	BT.15 (Ref.No.27UA/493)
Oil	OX-38 (Ref.No.34B/9100591; N.A.T.O. Code No.0-149)
Capacity	210 c.c.

FLYING CONTROL SYSTEM

Power units	
Type	
Aileron (four)	P112
Elevator (four)	P113
Rudder (duplex)	P114
Oil	OM-15 (Ref.No.34B/9100572; N.A.T.O. Code No. H-515)
Capacity (each)	
Aileron	6 pints
Elevator	6¼ pints
Rudder	8 pints
Gearboxes	
Oil	OX-23 (Ref.No.34B/9423150; N.A.T.O. Code No. O-158)
Capacity	60 c.c.
Air brakes	
Oil, (gearboxes)	OX-14 (Ref.No.34B/9100589; N.A.T.O. Code No.0-147)

DE-ICING SYSTEM

Windows

Tank (Pre-Mod.549)

Capacity 21 pints

Tank (Post-Mod.549)

Capacity 96 pints

Fluid Alcohol AL-8 (Ref.No.34B/9100475;
N.A.T.O. Code No. S-738)

FIRE-PROTECTION SYSTEM

Extinguishers - engines

Type ... Mk.13A, methyl bromide, 12 lb. (Ref.No.27N/99)

Number Four

Extinguishers - wing tanks

Type Mk.14A, methyl bromide, 12 lb. dual head
(Ref.No.27N/102)

Number Twelve

Extinguishers - fuselage tanks

Type ... Mk.13A, methyl bromide, 12 lb. (Ref.No.27N/99)

Number Four

Extinguishers - leading edge

Type ... Mk.13A, methyl bromide, 12 lb. (Ref.No.27N/99)

Number Six

Crews cabin

Type ... 34H bromochlorodifluoromethane (Ref.No.27N/299) ▶

Number Five

External compartment

Type ... 34H bromochlorodifluoromethane (Ref.No.27N/299) ▶

Number One

NITROGEN AND FUEL TANK PRESSURISATION SYSTEM

Cylinders Mk.10A (Ref.No.6D/9430574)

Number Twelve

Charging pressure 1,800 p.s.i.

Capacity (each) 2,250 litres

NITROGEN PURGE - FLIGHT REFUELLING

Cylinder Mk.5D (Ref.No.6D/9429890)

Number One

Charging pressure 1,800 p.s.i.

Capacity 750 litres

AIR SPEED INDICATING SYSTEM

Pressure heads (Pre-Mod.336) Mk.9 (Ref.No.6A/2959)

Pressure heads (Post-Mod.336) Mk.9C (Ref.No.6A/4835)

Position One on each wing tip

Incidence 2 deg. 30 min. to wing chord

Setting tolerance ± 15 min.

OXYGEN SYSTEM

Type Mk.17 - demand system

Cylinders Wire-wound Mk.10A (Ref.No.6D/9429900)

Number Eight

Charge pressure 1,800 p.s.i.

Capacity (each cylinder) 2,250 litres

SAFETY EQUIPMENT

Ejection seats

First pilot Mk.3 K1 (Ref.No.27L/50012)

Second pilot Mk.3 K2 (Ref.No.27L/50013)

Dinghy

Type M.S.5 Mk.1 (Ref.No.27C/2324)

ELECTRICAL SYSTEM

Wiring system Single pole, earth return

Type S.B.A.C. and AVRO

Generators (four) 112-volt d.c. 22½ Kw.

Type Rotax Type 551 (Ref.No.5UA/7440)

or Rotax Type 551A (Ref.No.5UA/7441)

Voltage regulators Type 90 (Ref.No.5UC/5522)

Thermal switches Type 1A, No.2 (Ref.No.5CW/4407)

Batteries (five) 24-v, 40 a.h. Type K2 (Ref.No.5J/3483)

Rotary transformers (three) Type A.M.1050 (Ref.No.5UB/5504)

Voltage regulators Type 66 (Ref.No.5UC/5524)

BOMBING GEAR

AV 176 Special carrier plus AV 241 fittings (1 off)

AV 177 Twin carrier plus AV 181 and AV 152 fittings (1 off)

AV 179 Septuple carrier (3 off)

AV 180 Quintuple carrier (2 off)

AV 222 Ten-way carrier (3 off)

AV 192 Carrier pick-up units (6 max.)

RESTRICTED

LEADING PARTICULARS

NAME	...	...	...	...	...	...	...	VULCAN B MK.1A
TYPE	...	...	...	...	...	...	...	DELTA WING MONOPLANE
DUTY	...	...	...	...	...	...	...	HIGH ALTITUDE, MEDIUM BOMBER
CREW	...	...	...	...	...	...	...	FIVE, INCLUDING TWO PILOTS

GENERAL DATA AND CONTROL SURFACE AREAS

For main aircraft dimensions refer to Fig.1. - General arrangement Mk.1A aircraft. For the settings and range of movement of control surfaces refer to Sect.3, Chap.4 and 4A.

Main plane data	
Aerofoil section at root	... .. N.A.C.A.0010
Aerofoil section at wing tip	... Modified R.A.E, 6.7 per cent
Chord (mean) standard	... .. 40.238 ft.
Chord at wing tip	... .. 8.16 ft.
Chord, root	... .. 63.40 ft.
Incidence	... .. 5 deg.
Dihedral	... .. 0 deg.
Sweepback - leading edge	... .. 49 deg.54 min.
Elevators, mean chord (aft of hinge line)	
Inboard	... .. 6.552 ft.
Outboard	... .. 6.097 ft.
Ailerons, mean chord (aft of hinge line)	
Inboard	... .. 4.263 ft.
Outboard	... .. 3.497 ft.
Main plane areas (in sq. ft.)	
(gross) from aircraft centre line	... .. 3,554
(net) excluding fuselage	... .. 2,974
Elevators (aft of hinge line)	
Inboard, each	... .. 63.8
Outboard, each	... .. 56.4
Total (effective area)	... .. 240.4
Ailerons (aft of hinge line)	
Inboard, each	... .. 32.2
Outboard, each	... .. 32.5
Gross, port and starboard	... .. 129.4
Fin and rudder data	
Fin, sweepback, leading edge	... .. 49 deg. 30 min.
Fin, sweepback, trailing edge	... .. 25 deg. 30 min.
Areas (in sq.ft.)	
Fin, Gross	... .. 261.421
Net	... .. 159.996

Rudder (aft of hinge line)	... .. 58.573
Total, Gross	... .. 330.00
Net (effective area)	... .. 218.65

ALIGHTING GEAR

Main-wheel units	
Type	Two forward retracting units with four wheeled, eight-tyred bogies and single shock-absorber strut. Dowty Part No. 2.00029.017 (port), 2.00029.018 (starboard).
Retracting strut assembly	
Type	A.7558Y Mk.A (port, A.7558Y Mk.B (starboard)
Jack strut assembly	
Type	1.01295.003 (port), 1.01295.004 (starboard)
Shock-absorber strut	
Type	Liquid spring, 0.8486Y B.01
Oil	OX-16 (Ref.No.34B/9423149)
Wheels	
Tyres	DR.0098 GA.3225 (Ref.No.27A/3377) ZA.167
Inner tubes	
Type	DT.0007/1 (Ref.No.27A/3526)
Brakes	
Type	AH.51238, front port inner, front starboard outer AH.51239, front port outer, front starboard inner AH.51708, rear port inner, rear starboard outer AH.51709, rear port outer, rear starboard inner
Working pressure	
Maxaret units	... .. 2,500 p.s.i.
Type	
Type	AC.61660, front port outer, front starboard inner AC.61662, rear port outer, rear starboard inner AC.61664, rear port inner, rear starboard outer AC.61666, front port inner, front starboard outer
Nose-wheel unit	
Type	Rearward retracting, steerable, 2.00050.004
Shock-absorber strut	
Type	Dowty liquid spring
Fluid	OX-16 (Ref.No.34B/9423149)

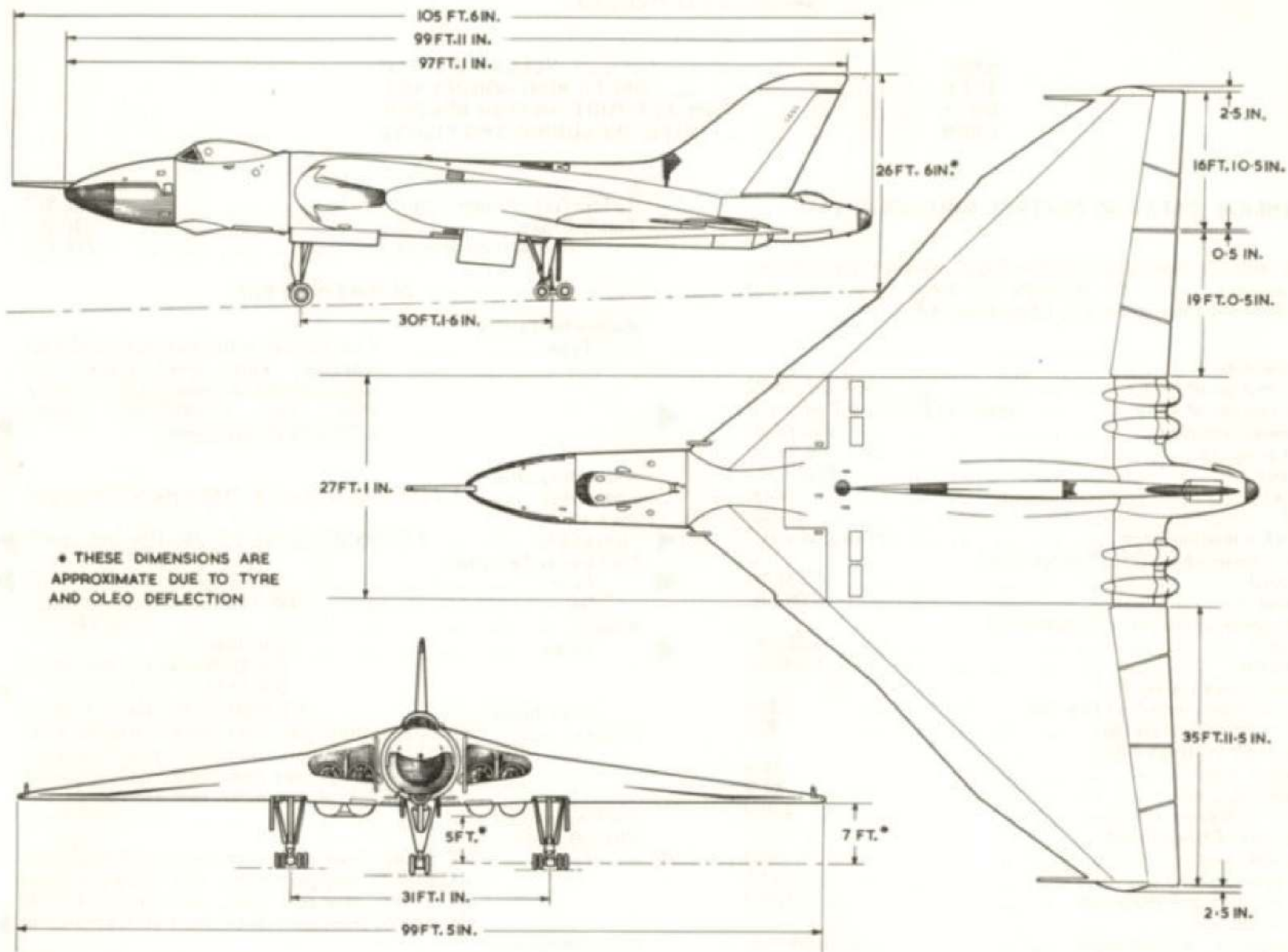


Fig. 1. General arrangement Mk. IA aircraft

RESTRICTED

Retracting strut 2.00051.003
Wheels AH.9527
Tyres ... DC. or DF. 4982, 30 x 9.00-15 (Ref.No.27A/3523)
Inner tubes FE.3 (Ref.No.27A/3527)

POWER UNITS

Name Olympus 101, 102 or 104
Type Turbo-jet
Number Four
Oil system
Type Integral with engine
Oil OX-38 (Ref.No.34A/9100591, N.A.T.O. Code No.0-149)
Tank capacity
Olympus 101 6 gall. oil, 4 gall. air space
Olympus 102 6.5 gall. oil 3.5 gall. air space
Olympus 104 7 gall. oil, 3 gall. air space
Engine capacity 1 gall. approx.
Starting system Electrical
Starter motor Rotax C.8601 (Ref.No.37F/5502)
Engine-driven auxiliaries
Hydraulic pumps Dowty A.8003Y/4000 (Ref.No.37J/8002)
Generators 22½ Kw. Rotax Type 551 (Ref.No.5UA/7440)
or Rotax Type 551A (Ref.No.5UA/7441)

FUEL SYSTEM

Fuel AVTAG. (Ref.No.34A/9100448)
Fuel pumps, main S.P.E.808, Mk.2
Fuel pumps, auxiliary S.P.E.106, Mk.1
Fuel transfer pumps B.P.8, Mk.4
Fuel low pressure warning switch setting 5 p.s.i.
Refuelling valves F.R. Mk.40
Rate of flow 50 gall. per min.
Tanks Fourteen

HYDRAULIC SYSTEM

Pumps
Type Dowty A8003Y/4000, (Ref.No.37J/8002)
Number Three
Working pressure 3,600 p.s.i.
Off-load pressure 4,000 p.s.i.
Peak pressure 4,400 p.s.i.

Reservoir Dowty A.6785Y
Capacity (to filling level)... .. 2¼ gall. (approx.)
Fluid Oil OM-15 (Ref.No.34B/9100572
N.A.T.O. Code No.H-515)
System capacity 12 gall.

EMERGENCY AIR SYSTEM

Cylinders Mk.5F (Ref.No.6D/9429887)
Number Two
Charging pressure... .. 3,000 p.s.i.
Capacity (each) 1,250 litres

PNEUMATIC SYSTEM - ENTRANCE DOOR

Cylinders Mk.5F (Ref.No.6D/9429887)
Number Two
Charging pressure... .. 2,000 p.s.i.
Capacity (each) 1,250 litres

PNEUMATIC SYSTEM - H2S SCANNER

Cylinder Mk.5D (Ref.No.6D/9429885)
Number One
Charging pressure... .. 1,800 p.s.i.
Capacity... .. 750 litres

PNEUMATIC SYSTEM - T4 BOMBSIGHT

Cylinder Mk.5D (Ref.No.6D/9429885)
Number One
Charging pressure... .. 2,000 p.s.i.
Capacity 750 litres

AIR CONDITIONING SYSTEM

Turbine unit
Type BT.15 (Ref.No.27UA/493)
Oil OX-38 (Ref.No.34B/9100591
N.A.T.O. Code No.0-149)
Capacity 270 c.c.

FLYING CONTROL SYSTEM

Power units	
Type	
Aileron (four)	... .. P112
Elevator (four)	... .. P113
Rudder (duplex)	... .. P114
Oil	... .. OM-15 (Ref.No.34B/9100572 N.A.T.O. Code No. H-515)
Capacity (each)	
Aileron	... .. 6 pints
Elevator	... .. 6¼ pints
Rudder	... .. 8 pints
Gearboxes	
Oil	... .. OX-23 (Ref.No.34B/9423150 N.A.T.O. Code No.0-158)
Capacity	... .. 60 c.c.
Air brakes	
Oil, (gearboxes)	... .. OX-14 (Ref.No.34B/9100589 N.A.T.O. Code No.0-147)

DE-ICING SYSTEM

Windows	
Tank (pre Mod.549)	
Capacity	... .. 21 pints
Tank (post Mod.549)	
Capacity	... .. 96 pints
Fluid	... .. Alcohol AL-8 (Ref.No.34B/9100475 N.A.T.O. Code No.S-738)

FIRE PROTECTION SYSTEM

Extinguishers - engines	
Type	... .. Mk.13A, methyl bromide, 12 lb. (Ref.No.27N/99)
Number	... .. Four
Extinguishers - wing tanks	
Type	... .. Mk.14A, methyl bromide, 12 lb. dual head (Ref.No.27N/102)
Number	... .. Twelve
Extinguisher - fuselage tanks	
Type	... .. Mk.13A, methyl bromide, 12 lb. (Ref.No.27N/99)
Number	... .. Four
Extinguishers - leading edge	
Type	... .. Mk.13A, methyl bromide, 12 lb. (Ref.No.27N/99)
Number	... .. Six

Crew's cabin	
Type	... 34H bromochlorodifluoromethane (Ref.No.27N/299)
Number	... .. Five
External compartment	
Type	... 34H bromochlorodifluoromethane (Ref.No.27N/299)
Number	... .. One

NITROGEN AND FUEL TANK PRESSURISATION SYSTEM

Cylinders	... .. Mk.10A (Ref.No.6D/9430574)
Number	... .. Twelve
Charging pressure	... .. 1,800 p.s.i.
Capacity	... .. 2,250 litres

NITROGEN PURGE - FLIGHT REFUELLING

Cylinder	... .. Mk.5D (Ref.No.6D/9429890)
Number	... .. One
Charging pressure	... .. 1,800 p.s.i.
Capacity	... .. 750 litres

AIR SPEED INDICATING SYSTEM

Pressure heads (pre Mod.828)	... .. Mk.9C (Ref.No.6A/4835)
Pressure heads (post Mod.828)	... .. Mk.9E (Ref.No.6A/5411)
Position	... .. One on each wing tip
Incidence	... .. 2 deg. 30 min. to wing chord
Setting tolerance	... .. ± 15 min.

OXYGEN SYSTEM

Type	... .. Mk.17 - demand system
Cylinders	... .. Mk.10A (Ref.No.6D/9429900)
Number	... .. Eight
Charge pressure	... .. 1,800 p.s.i.
Capacity (each cylinder)	... .. 2,250 litres

SAFETY EQUIPMENT

Ejection seats	
First pilot	... .. Mk.3 K1 (Ref.No.27L/50012)
Second pilot	... .. Mk.3 K2 (Ref.No.27L/50013)
Dinghy	... .. Type MS.5 Mk.1 (Ref.No.27C/2324) or Type MS.5 Mk.2 (Ref.No.27C/2376)

RESTRICTED

ADDITIONAL AIRBORNE EQUIPMENT

Pneumatic system	
Cylinders	Mk.5F (Ref.No.6D/9429887)
Number	Two
Charging pressure	3,000 p.s.i.
Capacity	1,250 litres
Water/glycol system	
Reservoir	Dawty 1.00467.101
Capacity (to filling level)	7½ pints
Air space	110 cu.in.
System capacity	7½ gall.(approx.)
Fluid	A.L.-26 (Ref.No.34B/1407)
Pumps (with non-return valve)	
Number	Two
Capacity (each)	300 g.p.h. at 10 p.s.i.
Refrigeration system	
Cooling pack	Godfrey Type V.C.P.1 Mk.1 (Ref.No.27UA/1716)
Refrigerant	Arcton 11 or Freon 11
Weight of refrigerant charge	11 lb.
Oil	Aeroshell 300 (Ref.No.34B/1430)
Oil capacity	300 c.c.
Condenser	D1177/24
Turbine geared alternator	
Type	T.G.A.30
Output	30k.VA
Gearbox	
Oil capacity	4½ pints (approx.)
Oil	OX-38 (Ref.No.34B/9100591) N.A.T.O. Code No.0-149

ELECTRICAL SYSTEM

Wiring system	Single pole, earth return
Type	S.B.A.C. and Avro
Generators (four)	112-volt d.c. 22½ Kw.
Type	Rotax Type 551 (Ref.No.5UA/7440) or Rotax Type 551A(Ref.No.5UA/7441)
Voltage regulators	Type 90 (Ref.No.5UC/5522)
Thermal switches	Type 1A, No.2 (Ref.No.5CW/4407)
Batteries (five)	24-v, 40 a.h., Type K2 (Ref.No.5J/3483)
Rotary transformers (three)	Type A.M.1050 (Ref.No.5UB/5504)
Voltage regulators	Type 66 (Ref.No.5UC/5524)

BOMBING GEAR

AV.192 Carrier hoisting and suspension units	6 max.
AV.176 Special carrier plus AV.241 fittings	1 off
AV.176 Special carrier plus AV.258 fittings	1 off
AV.179 Septuple carrier	3 off

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