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14

RESTRICTED

COVER 1
Containing:-
SECTION 6
CHAPTERS 1–12

AIR PUBLICATION
101B-1902-1B
(Formerly A.P.4505B, Vol.1, Book 2)

VULCAN B Mk.2 AIRCRAFT

AIRCRAFT SERVICING MANUAL

ELECTRICAL INSTALLATION

BY COMMAND OF THE DEFENCE COUNCIL

J. T. Dunnett

Ministry of Defence

FOR USE IN THE ROYAL AIR FORCE

(Prepared by the Ministry of Technology)

Issued with A.L.73, Dec.68

RESTRICTED

A.P.101B-1902-1B
A.L.68, Feb.68

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

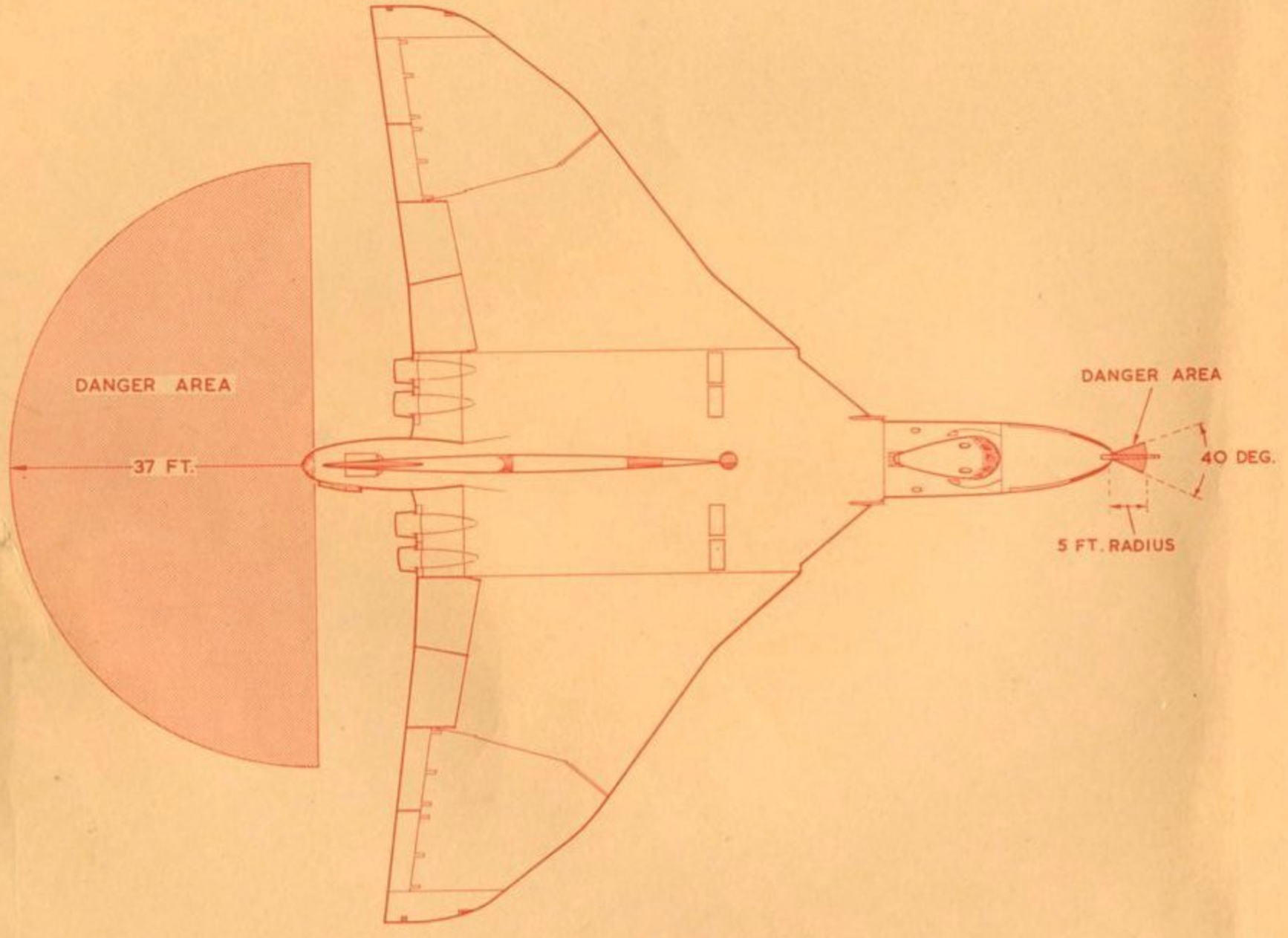
VOLTAGES IN EXCESS OF 100 VOLTS, EITHER A.C. OR D.C., CAN BE DANGEROUS UNDER CERTAIN CIRCUMSTANCES. PERSONNEL MUST THEREFORE ENSURE THAT THE ELECTRICAL SYSTEM IS ELECTRICALLY SAFE BEFORE ANY SERVICING IS ATTEMPTED. WHERE IT IS ESSENTIAL THAT TESTS OR ADJUSTMENTS BE MADE WITH THE ELECTRICAL POWER SWITCHED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

MICROWAVE RADIATION

There is a MICROWAVE RADIATION HAZARD from certain equipment in this 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.



Microwave radiation area

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 the 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. 4505B to A.P.101B-1902 in November 1966. 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.
Aircraft pressurising and air conditioning equipment	4340
Aircraft pressure fuelling equipment	4511
Aircraft refuelling in flight	4611
Aircraft undercarriage equipment	1803E
Aircraft undercarriage equipment Dowty Rotol	1805V
Aircraft vapour cycle heat transfer equipment	4787
Aircraft wheels tyres and brakes	2337
Automatic flight controls	1469
Bomb carriers	1664
Data book on safety and survival equipment and flying clothing	4380
Dunlop equipment fitted to Vulcan A/C	4515C
Dunlop pneumatic equipment	4303B
Ejection seats and escape equipment	4288A & C
Electrical manual	4343
Hydraulic equipment	1803
Instrument manual	1275
Missile storage, preparation, transportation, loading and off loading	2852B
Olympus Mk.20101, Mk.20201 and Mk.20301 engine change units	4712A, B & C
Olympus Mk.30101 engine change unit	4783A
Powered flying control units and equipment	4603
Ram air turbine	2240C
Rover auxiliary airborne power plant	4617A

LIST OF AIR DIAGRAMS

	A.D.
Access panels and drain holes	7086Q
Cabin air conditioning and pressurisation	7086V
De-icing systems	6022D
E.C.U. installations	7086E
Electrical installations	7086L
Emergency system and exits	7086N
Fire extinguishing system	7086M
Flying controls and lubrication	7086C
Fuel systems	6022F
Hydraulic systems	7086H
Jet efflux - danger areas	7086X
Miscellaneous lubrication	7086B
Pneumatic systems	7086P

LAYOUT OF A.P. 101B - 1902

VULCAN B. MK.2 AIRCRAFT

Code No.	Title	Previous designation
101B-1902-1	Aircraft servicing manual	A.P.4505B, Vol.1
Issued in five books as follows:		
101B-1902-1A Cover 1	*Sect. 1 & 2*	*A.P.4505B, Vol.1, Book 1*
101B-1902-1A Cover 2	*Sect. 3, 4 & 5*	*A.P.4505B, Vol.1, Book 1*
101B-1902-1B Cover 1	*Sect. 6 Chapters 1-12*	*A.P.4505B, Vol.1, Book 2*
101B-1902-1B Cover 2	*Sect. 6 Chapters 13-24*	*A.P.4505B, Vol.1, Book 2*
101B-1902-1C	*Sect.7 to 9*	*A.P.4505B, Vol.1, Book 3*
101B-1902-2	General orders	A.P.4505B, Vol.2
101B-1902-3A	Illustrated parts catalogue	A.P.4505B, Vol.3, Part 1
101B-1902-3B	Appendix 'A'	A.P.4505B, Vol.3, Part 2
101B-1902-3C	Scales of unit equipment	A.P.4505B, Vol.3, Part 3
101B-1902-3D	Scales of servicing spares	A.P.4505B, Vol.3, Part 4
101B-1902-4	Planned servicing schedule	A.P.4505B, Vol.4
101B-1902-5	Not applicable	A.P.4505B, Vol.5
101B-1900-6A	Aircraft repair manual	A.P.4505, Vol.6
101B-1902-7	Modifications list	A.P.4505, M.L.
101B-1902-12	Ground handling notes	A.P.4505B-G.H.N.
101B-1902-15	Pilot's notes	A.P.4505B-P.N.
101B-1902-16	Operating data manual	A.P.4505B-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.

A.P.101B–1902–1B, Cover 1
AL.73, Dec.68

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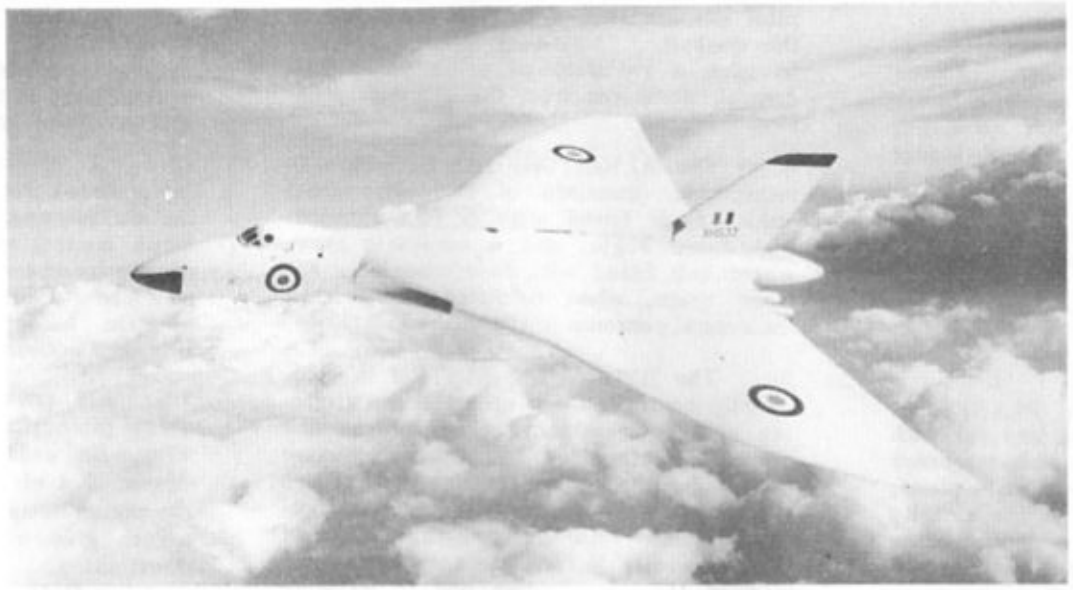
SECTION 6

ELECTRICAL SYSTEM

LIST OF CHAPTERS

NOTE: A detailed list of contents appears at the beginning of each chapter.

INTRODUCTION



1. The VULCAN B Mk.2 is an all metal medium bomber with a tailless delta wing configuration, and is powered by four turbo-jet engines. It has long range, a very fast cruising speed and a high operational ceiling, and can carry a heavy and extensively variable bomb load. Provision is made for flight refuelling, as a receiver aircraft. A comprehensive radar and radio installation and other electronic aids are provided for navigating and bombing. No defensive armament is fitted.

2. The FUSELAGE is a light-alloy stressed skin structure, and is manufactured in four separate sections, which are:-

(1) Nose fairing, which houses the radar scanner. The upper half is of orthodox metal construction, and the lower half is made of sandwich material which is transparent to radar signals.

(2) Front section - comprises the crew's pressure cabin, of circular cross section with a canopy over the cockpit and an air bomber's blister and crew's entrance door in the under surface. The structure of this section is stressed to a working pressure differential of 9 p.s.i.

(3) Centre section - is integral with the main plane, the width encompassing the four engines and the bomb bay, and the length extending from the rear cabin bulkhead to a point aft of the rear spar. Two strong ribs form the side walls of the bomb bay, separating it from the inboard engine bays; these ribs extend forward of the front spar to enclose a box structure housing two large fuel tanks. Between this structure and the pressure cabin is the nosewheel bay, which houses pressurisation control gear, radio and radar equipment and two additional fuel tanks. The bomb bay is a single large compartment occupying the full length of the fuselage between front and rear spar.

(4) Rear section - a light former-stringer-skin structure forming a fairing for the jet pipe tunnels. Attached to this structure are the jet pipe end caps and the tail warning radar scanner cone.

3. SEATS for five crew members are all located in the pressurised cabin in the forward end of the fuselage. The two pilots sit side by side in ejector seats on a raised platform at the forward end of the cabin, and the remaining three crew members sit side by side in

bucket-type seats facing aft, at a single table extending the full width of the cabin. A prone bombing station is provided in a blister below the cabin.

4. The ENTRANCE DOOR, situated in the lower part of the fuselage below the crew's compartment, opens outwards, entry being made by a folding ladder secured to the inside of the door. A further ladder is provided in the cabin for access to the pilots' position. Manually and pneumatically-operated mechanisms are fitted, the latter being utilised to open the door in flight against the airstream, thus forming a windbreak for emergency exit.

5. The TWO-SPAR MAIN PLANE consists of a centre section integral with the fuselage, and port and starboard outer wings. The complete main plane, which has sufficient depth in the vicinity of the root break joints to accommodate the engines and the alighting gear, tapers in plan and elevation to the wing tips. The skin covering is of aluminium alloy stiffened by Z-section and T-section stringers. Ten compartments are provided, five in each outer wing, to accommodate bag-type flexible fuel tanks.

6. The CONTROL SURFACES consist of four elevons on each outer wing, and a rudder. The outboard elevons are mass balanced by means of mass balances carried on outrigger arms situated near each hinge, and the inboard elevons and rudder embody Westland-Irving type forward sealed balances. Each elevon is operated independently by its own electro-hydraulic power unit, two further units being provided for the rudder. Electrically-operated, rotating-slat-type air brakes are mounted in the main plane above and below the engine air intakes.

7. The PILOTS' FLYING CONTROLS consist of single-grip control handles and conventional rudder pedals provided at each pilot's position. Push-pull control tubes are used throughout from the cockpit controls to the power units actuating the control surfaces. Further controls for pilot use are housed on three consoles in the cockpit. Artificial feel is provided to give a variation of stick force with control movement from the trimmed position.

8. The ALIGHTING GEAR, which is retractable, consists of two main-wheel units, each fitted with a four-wheeled, eight-tyred bogie, and a steerable nose-wheel unit fitted with twin wheels. All three units, when retracted, lie within the normal contours of the aircraft.

9. 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. When certain special stores are carried an independent electrically driven hydraulic power pack is fitted in the bomb bay.

10. 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.

11. An AIR CONDITIONING SYSTEM is installed to maintain the air in the crew's compartment at reasonable temperatures and pressures. Air from the engine compressors is used for pressurisation and heating, the flow of air being automatically maintained by flow controllers. Air conditioning equipment in the nosewheel bay controls the temperatures of the air entering the cabin, and the pressure in the cabin is maintained by pressure controllers which regulate the amount of air allowed to pass to atmosphere through discharge valves. Provision is also made for cabin ventilation during unpressurised flight. A further air conditioning system, supplied with engine compressor air, is fitted in the bomb bay when certain special stores are carried.

12. A VENTILATED SUIT SYSTEM is provided for the five crew members, the air for which is tapped from the main cabin pressurisation system. The inlet air temperature to the individual suits may be varied by manually controlled electric heaters fitted in each supply line, and accessible to each crew member.

13. A thermal DE-ICING SYSTEM provides protection against ice accretion on wing, fin and engine air intake leading edges; hot air for the systems is bled off the engine compressors and mixed with cold air to give a controlled temperature for distribution. A further system, utilising de-icing fluid, is provided for the pilots' and air bomber's windscreens.

14. The ENGINES are housed in pairs inside the main plane centre section, between the front and rear spars. Installation of the engines is by the use of four manually-operated winches from underneath the aircraft, which enables the upper surface of the wing to be maintained as a smooth unbroken surface and avoids the use of large long-jib cranes and slinging gear.

15. FUEL is carried in fourteen bag-type tanks contained in magnesium-alloy compartments, four tanks in the fuselage and five in each outer wing. Each tank is equipped with contents gauge transmitters, electrically-operated fuel pumps, a maximum fuel level cut-off switch and refuelling valves. In addition, 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. The tanks are arranged in groups

so that each engine is normally fed by a particular group of tanks. Cross-feed cocks are provided so that in emergency any engine may receive fuel from any tank or group of tanks. All tanks are pressurised to prevent vaporisation and consequent loss of fuel at altitude, air from the engine compressors being used for this purpose. A pressure refuelling system is provided, in which the distribution of fuel load amongst all the tanks is automatically controlled to ensure correct aircraft loading.

16. FIRE PROTECTION consists of two separate methyl-bromide installations, one for the engines and the other for the fuel tank bays. Hand-operated B.C.F. extinguishers are disposed at convenient positions in the crew's compartment.

17. ADDITIONAL AIRBORNE EQUIPMENT is mounted in the rear fuselage. Temperature control of the E.C.M. cannisters is effected by water/glycol and vapour cycle heat control systems, whilst the tail warning unit, which forms the fuselage rear cone, is provided with pneumatic and cooling systems. Three doors on the underside of the rear fuselage give access to this equipment. Counterpoise plates of honeycomb construction are mounted below the starboard centre engine rib, between the jet pipe curvatures.

18. Electrical power is supplied by four 40 kVA, 200-volt, 3-phase, 400 Hz a.c. engine-driven alternators, arranged to supply independent load or in parallel via a synchronizing ring main system. Reserve power is supplied from the auxiliary airborne power plant or the ram air turbine at 200-volt, 3-phase, 400 Hz, a.c. Power at 115-volt, 3-phase, 400 Hz, a.c. is provided, through various transformers, from the 200-volt system, and from the same source by means of two frequency changers, a supply at 115-volt, single phase, 1 600 Hz, a.c. is also available. D.C. power is provided at 28 volts through two 7.5 kVA transformer rectifier units, and a single 24-volt battery provides sufficient power for crash and emergency services. Two ground supply plugs, one for 200 volts a.c. and one for 28 volts d.c. are provided on the port side of the rear fuselage. In addition a 28-volt d.c. ground servicing plug for the refuelling circuits, is provided on the starboard outer side of the nose-wheel bay. In the unlikely event of failure of all four alternators, sufficient power to maintain control would be available from the auxilliary power units.

19. LIGHTING in the cabin consists of ultra-violet, red and anti-dazzle for the pilots, while for the crew four red fluorescent tubular elements are provided and an angle-poise lamp at each crew position. 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.

20. EMERGENCY EQUIPMENT includes ejection seats for the first and second pilots, a signal pistol, first-aid outfits, fire axes, asbestos gloves and hand-operated fire extinguishers. For use after ditching, each member of the crew has a seat dinghy and there is also a type H dinghy stowed in the fuselage underneath the canopy.

21. WIRELESS equipment consists of a general purpose H.F. transmitter-receiver, a combined V.H.F./U.H.F. transmitter-receiver, V.H.F. transmitter-receiver and I.L.S. installation. A high/low F.M. radio altimeter provides indication for, and is controlled by, the first pilot and is an integral part of the automatic landing system. A high range radar altimeter provides indication for, and is controlled by, the navigator/air bomber. A.D.F. equipment is fitted and operated by the navigator/plotter. Intercommunication between crew members is provided by a separate system, with switching facilities for introducing radio signals and conference intercom.

22. RADAR installations consisting of Green Satin, Tail Warning, I.F.F., Tacan, N.B.S. (comprising H.2.S and N.B.C.), E.C.M. and T.F.R. are fitted.

23. Special instrument systems, namely M.F.S. and H.R.S. are installed and may be integrated with each other and other systems in the aircraft to provide automatic flight, automatic landing, bombing manoeuvres and accurate navigational information.

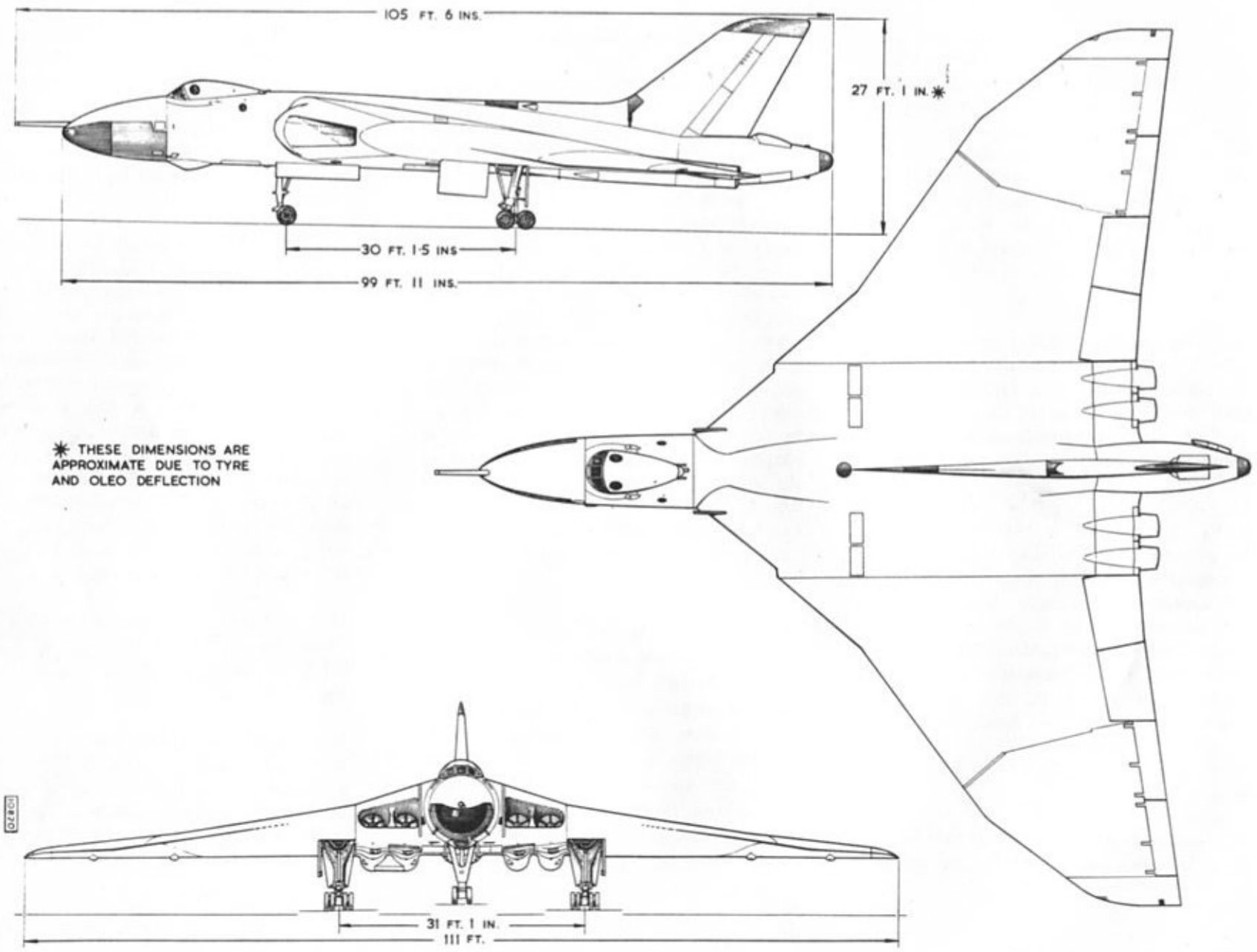


Fig.1 General arrangement

LEADING PARTICULARS

(Completely revised)

NAME. . . . . VULCAN B, MK.2
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. For 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 . . . . . Modified R.A.E.104, 5%
Chord (mean) standard. . . . . 35.712 ft.
Chord at wing tip . . . . . 10 ft.
Chord (root). . . . . 63.4 ft.
Incidence. . . . . 5 deg.
Dihedral . . . . . 0 deg.
Sweepback (leading edge at wing joint) . . . . . 49 deg. 54 min.
Elevons, mean chord (aft of hinge line)
Inboard inner . . . . . 6.562 ft.
Inboard outer. . . . . 6.571 ft.
Outboard inner. . . . . 2.776 ft.
Outboard outer. . . . . 2.776 ft.
Main plane areas (in sq. ft.)
Gross, including elevons (from aircraft centre line). 3,964
Nett, excluding fuselage 3,384
Elevons (aft of hinge line)
Inboard inner (each) 63.726
Inboard outer (each) 57.164
Outboard inner (each) 28.079
Outboard outer (each) 26.788
Gross, port and starboard 351.514

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 and rudder 224
Fin (nett). 160.065
Rudder (aft of hinge line) 63.395

ALIGHTING GEAR

MAIN-WHEEL UNITS

Type. . . . . Dowty — Two rearward retracting units with four-wheeled, eight-tyred bogies Dowty Part No. 2.00421.048 port and 2.00422.048 starboard
Shock-absorber strut . . . . . Dowty Part No. 2.00211.005
Type. . . . . Liquid spring
Oil . . . . . OX-16 Ref. No. 34B/9423149
Retracting strut unit . . . . . Dowty Part No. 2.00176.001 (port) and 2.00176.002 (starboard)
Jack assembly. . . . . Dowty Part No. 1.03024.010 (port) and 1.03025.010 (starboard)
Wheels. . . . . Dunlop Part No. A.H.52235
Tyres (tubeless). . . . . Dunlop DRR 0046T (Ref. No. 27A/6115998) or Goodyear GA 6210 (Ref. No. 27A/6115998)
Brakes. . . . . Front port inner and front starboard outer A.H.50723
Front port outer and front starboard inner A.H.50724
Rear port inner and rear starboard outer A.H.51711
Rear port outer and rear starboard inner A.H.51712
Brakes working pressure . . . . . 2,500 lbf/in^2
Maxaret units . . . . . Front port inner and front starboard outer A.C.61682
Front port outer and front starboard inner A.C.61676
Rear port inner and rear starboard outer A.C.61680
Rear port outer and rear starboard inner A.C.61678

NOSE-WHEEL UNIT

Type. . . . . Dowty — Rearward retracting steerable Part No. 2.00065.022

Shock-absorber strut . . . . . *Part No.2.00066.004*
Type . . . . . *Liquid spring*
Fluid . . . . . *OX-16 Ref. No. 34B/9423149*
Retracting jack . . . . . *Dowty Part No. 1.01299.014*
Retracting strut . . . . . *Dowty Part No. 2.00051.003*
Wheels . . . . . *Dunlop Part No.AH.50734*
Tyres (tubeless) . . . . . *Dunlop DR.4996T (Ref. No. 27A/4560766) or Firestone ZA.203 (Ref. No. 27A/4560766)*

POWER UNITS

ENGINE
Name . . . . . *Olympus 201, 202 or 301*
Type . . . . . *Turbo-jet*
Number . . . . . *Four*
OIL SYSTEM
Type . . . . . *Integral with engine*
Oil OX-38 (Ref. No. 34B/9100591) N.A.T.O. Code No.0-149
Tank capacity (201 and 202 engines) . . . . . *4.5 gall. oil, 1.5 gall. air space*
Engine capacity . . . . . *2.25 gall.*
Total oil capacity . . . . . *6.75 gall.*
Tank capacity (301) . . . . . *3.875 gall. oil. 1.125 gall. air space*
Engine capacity . . . . . *2.25 gall.*
Total oil capacity . . . . . *6.125 gall.*
STARTING SYSTEM
Olympus 201 and 202 . . . . . *Rotax (low pressure air) Type CT.0806 (one per engine)*
Olympus 301 . . . . . *Rotax (combuster) Type CT.1303 (one per engine)*
ENGINE-DRIVEN AUXILIARIES
Hydraulic pumps (1, 2 and 3 engines) . . . . . *Dowty – Part No. 1.00500.044*
Alternators
Type (201 and 202 engines) *AE.2039*
Type (301 engine) *AE.2039 Mk.2*
Constant speed drive unit *AE.8004*
C.S.D. lubrication system . . . . . *Oil – OX-38*
Tank capacity . . . . . *11 Pints oil – 3.5 pints air space*
Total capacity of system . . . . . *12.75 pints*
AIRBORNE AUXILIARY POWER PLANT
Type . . . . . *ROVER 10301 Gas turbine*
Number . . . . . *One*
Lubrication system . . . . . *Oil (sump type) integral with engine*
Oil *OX-38*
Sump capacity . . . . . *5.5 pints*
Starting system (A.A.P.P.)
Normal . . . . . *Electric – Rotax C1050 (28V)*
Emergency . . . . . *Cartridge, electric (Ref. No. 12K/9635210)*

FUEL SYSTEM

FUEL

UK Inter-service designation	*NATO Code*	*USA Inter-service designation*	*Reference number*
Avtur/FSII	*F-34*	*JP8*	*34A/2201036*
Avtag/FSII	*F-40*	*JP4*	*34A/2201037*

Fuel pumps, main . . . . . *P.A.C. 1200 Mk.3*
Fuel pumps, auxiliary . . . . . *P.A.C. 100 Mk.3*
Fuel transfer pumps . . . . . *P.A.C. 500 Mk.3*
Fuel pumps – A.A.P.P. . . . . . *P.A.C. 20 Mk.2*
Fuel L.P. warning switch setting . . . . . *5 lbf/in²*
Refuelling valves . . . . . *F.R. Mk.40*
Rate of flow (each) . . . . . *75 gall. per min.*
Tanks – Wing *14*
Bomb bay *2*
A.A.P.P. *1*

HYDRAULIC SYSTEM

PUMPS
Type . . . . . *Dowty 1.00500.044 Ref. No. 37J/6092159*
Number . . . . . *Three*
Working pressure . . . . . *3,600 lbf/in²*
Off-load pressure . . . . . *4,000 lbf/in²*
Peak pressure . . . . . *4,400 lbf/in²*
Reservoir . . . . . *Dowty – 1.03312.001*
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. approx.*

EMERGENCY AIR SYSTEM

CYLINDERS . . . . . *Mk.5F (Ref. No. 6D/9429887*
Number . . . . . *Two*
Charging pressure . . . . . *3,000 lbf/in²*
Capacity (each) . . . . . *1,250 litres*

PNEUMATIC SYSTEMS

ENTRANCE DOOR
Cylinders . . . . . *Mk.5F (Ref. No. 6D/9429887)*
Number . . . . . *Two*

Charging pressure	2,000 lbf/in²
Capacity (each)	1,250 litres
T4 BOMBSIGHT	
Cylinder	Mk.5F (Ref. No. 6D/9429887)
Number	One
Charging pressure	2,000 lbf/in²
Capacity	1.250 litres
N.B.C. Mk.1A and H.2.S.	
Cylinders	Mk.5D (Ref. No.6D/9429885)
Number	Two
Charging capacity	1,800 lbf/in²
Capacity (each)	750 litres

NITROGEN PURGE-FLIGHT REFUELLING

CYLINDER	Mk.5D (Ref. No. 6D/9429890)
Number	One
Charging pressure	1,800 lbf/in²
Capacity	750 litres

AIR CONDITIONING SYSTEM

TURBINE UNIT	
Type	B.T.15 Mk.2A (Ref. No. 27UA/493)
Lubrication	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	Hydraulic
Outer elevons (four)	P.135
Inner elevons (four)	P.132
Rudder (two)	P.138
Fluid	Oil OM-15 (Ref. No. 34B/9100572)
Capacity (each)	4 pints
Outer elevons	4 pints
Inner elevons	8 pints
AIR BRAKES	
Gearbox lubrication	Oil OX-14 (Ref. No. 34B/2246128) N.A.T.O. Code No. 0-147

DE-ICING SYSTEMS

AIR BOMBER'S WINDOW
Rendered inoperative

FIRE PROTECTION SYSTEMS

EXTINGUISHERS	
Engine bay	System operated
Type	Mk.13A methyl-bromide (Ref. No. 27N/990)
Number	Four
Wing tanks	System operated
Type	Mk.14A methyl-bromide (Ref. No. 27N/102)
Number	Twelve
Fuselage tanks	System operated
Type	Mk.13A, Methyl-bromide (Ref. No. 27N/990)
Number	Four
Leading edge	System operated
Type	Mk.13A, Methyl-bromide (Ref. No. 27N/990)
Number	Six
A.A.P.P. Installation	System operated
Type	Mk.4AX, Methyl-bromide (Ref. No. 27N/152) (or 27N/100)
Number	One
Bomb bay	System operated
Type	Mk.13A, Methyl-bromide (Ref. No. 27N/990)
Number	Eight
Crew's cabin	Hand operated
Type	Mk.34H, Bromochlorodifluoromethane (B.C.F.) (Ref. No. 27N/299)
Number	Five
External compartment	Hand operated
Type	Mk.34H, Bromochlorodifluoromethane (B.C.F.) (Ref. No. 27N/299)
Number	One

AIR SPEED INDICATING SYSTEM

PRESSURE HEADS	Mk.8W, (Ref. No. 6A/4333460)
Number	Two
Position	Underside of fuselage at forward end of cabin, port and starboard

OXYGEN SYSTEM

Type	Mk.21B, demand system
Cylinders	Mk.10A, (Ref. No. 6D/9429900)
Number	Twelve
Charge pressure	1,800 lbf/in²
Capacity (each cylinder)	2,250 litres

SAFETY EQUIPMENT

EJECTION SEATS
- *First pilot* . . . . . *Type 3KS1 Mk.4 (Ref. No. 27L/50166)*
- *Second pilot* . . . . . *Type 3KS2 Mk.4 (Ref. No. 27L/50168)*

CREW SEATS
- *Outboard seats* . . . . . *Swivel and sliding (pneumatically assisted) (Ref. No. 27HS/4527211) with (Part No. S1.003.1 and S1.003.2)*
- *Centre seat* . . . . . *Sliding (pneumatically assisted) (Part No. 1/N3288)*

DINGHY . . . . . *M.S.5., Mk.1 (Ref. No. 27C/9497567)*

ADDITIONAL AIRBORNE EQUIPMENT

PNEUMATIC SYSTEM
- *Cylinders* . . . . . *Mk.5F (Ref. No. 6D/9429887)*
- *Number* . . . . . *Two*
- *Charging pressure* . . . . . *3,000 lbf/in²*
- *Capacity* . . . . . *1,250 litres*

WATER/GLYCOL SYSTEM
- *Reservoir* . . . . . *Dowty (Part No. 1.00467.101)*
  - *Capacity (filling level)* . . . . . *7.5 pints*
  - *Air space* . . . . . *110 cu. in*
  - *System capacity* . . . . . *7.5 gall. approx.*
- *Fluid* . . . . . *AL-26 (Ref. No. 34B/1407)*
- *Pumps (with U.P.V.)* *S.P.E.16291*
- *Number* . . . . . *Two*
- *Capacity (each)* . . . . . *300 g.p.h. at 10 lbf/in²*

REFRIGERATION SYSTEM
- *Cooling pack* . . . . . *Godfrey Type V.C.P.1 Mk.1 (Part No. 159102)*
- *Refrigerant* . . . . . *Arcton 11 or Freon 11*
- *Weight of refrigerant* . . . . . *11 lb.*
- *Oil* . . . . . *OM-11 (Ref. No. 34B/9105055) N.A.T.O. Code No. 0-135*
- *Oil capacity* . . . . . *300 c.c.*
- *Condenser* *D1177/2A*

ELECTRICAL SYSTEM

- *Wiring system* . . . . . *Insulated and earth return*
- *Type* . . . . . *Avro*
- *A.C. generators (four)* . . . . . *200-volt, 3-phase, 400 c/s, 40 kVA, Type 158B (Ref. No. 5UA/4357453)*
- *Transformer-rectifier units, 7.5 kW (Two)* . . *(Ref. No. 5UC/4395968)*
- *Main transformers 3 kVA (two)* . . . . . *(Ref. No. 5UB/4342575)*
- *Battery (one)* . . . . . *Type K, 24-volt, 40 a.h.*
- *Frequency changers (two). B.T.H. Type 270 (Ref. No. 5UB/4357500)*

BOMBING GEAR

A.V.179 Septuple carrier . . . . . *(3 off)*
or
A.V.176 Special carrier plus A.V.258 fittings . . . . . *(1 off)*
No.1, Mk.2 Special carrier (Ref. No. 11A/4762) . . . . . *(1 off)*
or
No.2 Mk.1 Carrier (Ref. No. 11A/4759) . . . . . *(1 off)*
with
Adapter assembly No.1, Mk.1 (Ref. No. 11A/4486965)
Blue Steel carrier beam and associated (Mod.200) fittings (Part No. 1/Z10005) for aircraft with Mod. Nos. 108, 199, 525 and 748 embodied.