Chapter 2

PREPARATION FOR FLIGHT

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LIST OF ILLUSTRATIONS

WARNING...

Before entering the cockpit for any purpose, personnel must ensure that the ground safety precautions affecting the ejection seats have been applied in accordance with the instructions given in the ejection seat warning in Sect.1, Chap.1 of this publication.

Introduction

1. This chapter gives information on the general preparation of the aircraft for flight. Servicing and replenishing points are illustrated on fig.1 and 2. Specifications for oil, fuel, etc., are given in the Leading Particulars. The method of using the fluid pressurised replenishing can, (Ref.No.4G/5358), referred to in para.7 and 8, is detailed in A.P.1464B, Vol.1, Part 2, Sect.3, Chap.6.

GROUND SUPPLIES

WARNING...

Before connecting any ground electrical supply, ensure that the powered flying control switches (port console) have been moved to OFF before the engines are stopped. Alternatively, connect the 28-volt supply only and with the battery isolation switch ON, press, in turn, each of the ten switches on the port console. Failure to comply with this instruction imposes an excessive electrical load on the flying control motors.

2. External sockets for the 112-volt and 28-volt ground supplies are situated on the port side of the rear fuselage adjacent to the power compartment. When connecting the ground supply cables they are to be supported by attaching the harness hook to the bracket provided between the pair of aircraft sockets. To enable the aircraft to be earthed during ground servicing operations a ground earth point is introduced by Mod.1793, at the forward end of the nose-wheel bay aperture starboard longeron.

3. The 28-volt ground supply may be utilised to energise a separate ground lighting circuit for use during servicing. The control switch for this circuit is in the power compartment. When this switch is operated, lights are provided in the following positions:-

Two - each main-wheel bay

Two - nose wheel bay

Nine - bomb compartment

Two - power compartment

Two - rudder powered flying controls compartment.

In addition to the above lights the following are provided and energised by the aircraft batteries:-

Two inspection lamp sockets, for use with Mk.2 inspection lamps, are fitted, one on the front bomb bay bulkhead and one on the rear bomb bay bulkhead.

A light in the roof of the rear power compartment.

REFUELLING

4. Two refuelling points are located in each main-wheel bay, access to which is by a detachable panel in the outer fixed fairings. Between the port pair of refuelling points is a control lever which, when pulled, operates a micro switch to

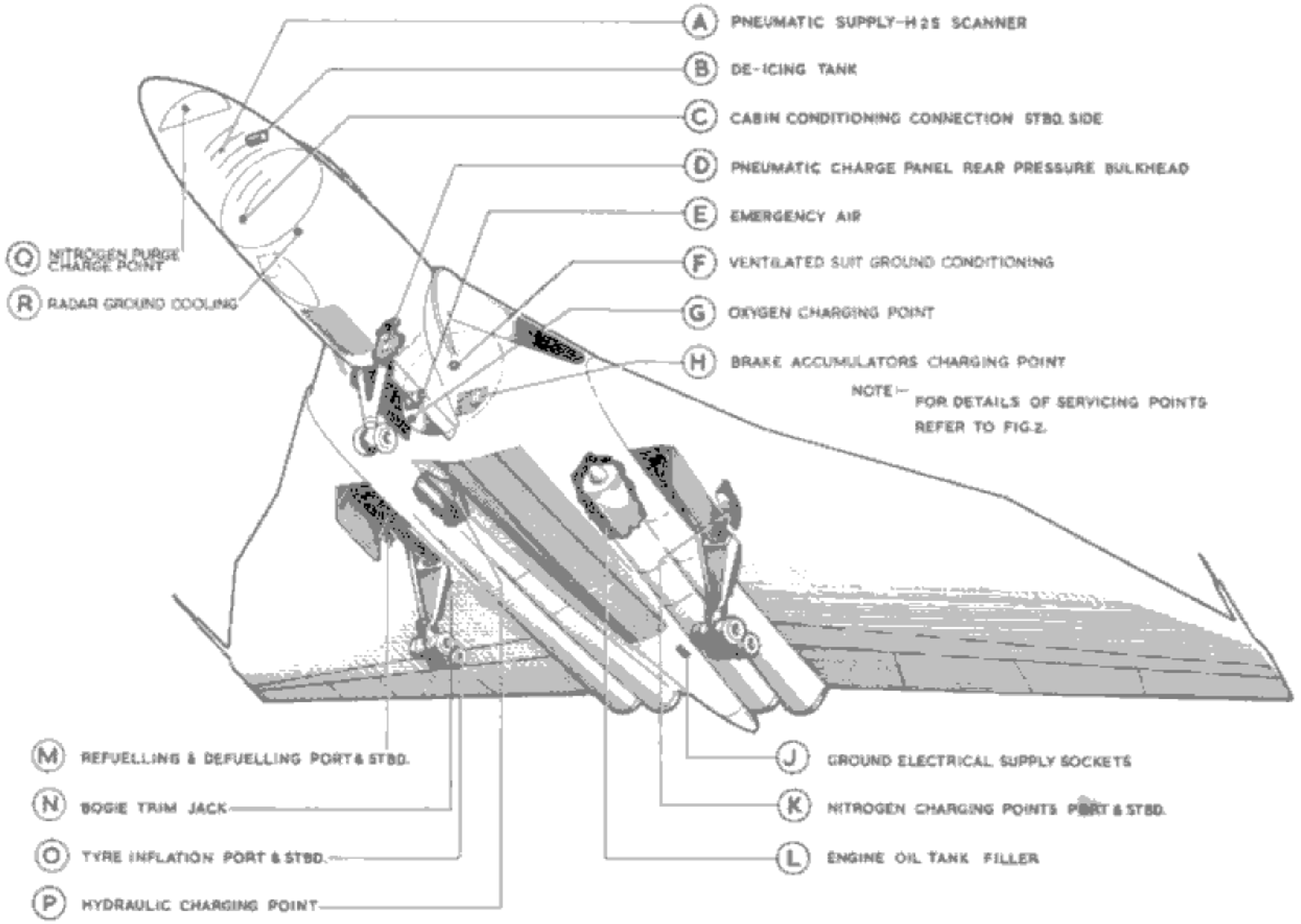

Fig. 1. Location of servicing points

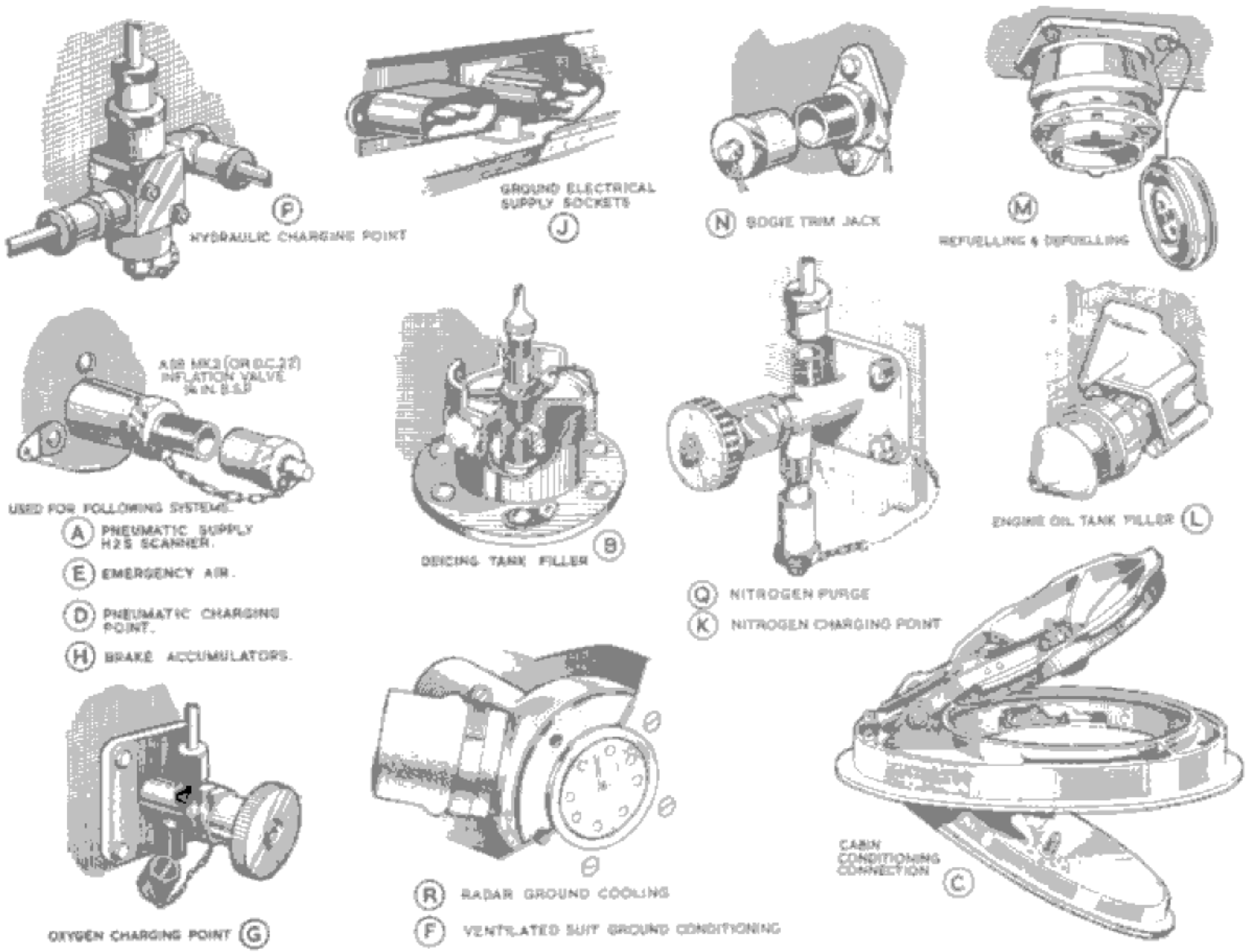

Fig.2. Details of servicing points.

energise the stabilised voltage power pack. Refuelling control panels 36P (port) and 37P (starboard) are located on the outboard rib in each main-wheel bay. The two refuelling points on each side of the aircraft are connected in parallel and either single-point or double-point (using two refuellers) refuelling is available. If desired both sides of the aircraft can be refuelled simultaneously.

NOTE...
The tanks must only be filled from a 2,500 gall. dual purpose refueller, Zwicky (refer to A.P.4573A, Vol.1) or Thompson (refer to A.P.4485, Vol.1) fitted with a streamline filter, Part No.K8927, Mk.2 (Ref. No. 53PR/27).

◀ *WARNING...*

1. *Before starting a refuelling operation the following precautions must be observed to ensure that the required electrical circuits are energised and that the various electrical components are in the correct attitude when the ground electrical power supply is connected.*

   (1) The flight refuelling MASTER switch (starboard console) is in the OFF position. Failure to comply will result in the ground refuelling sequence circuit being cancelled and all fuel tanks being refuelled simultaneously. Refuelling from the ground refuelling points under these conditions will cause incorrect distribution throughout the tanks, resulting in a tail heavy condition.

   (2) The flight refuelling system nitrogen purge switch (starboard console) is in the OFF position. Should this switch be inadvertently left in the ON position the No.2 tank refuelling valves will be opened and fuel venting will occur.

   (3) The C.G. transfer switches (centre console) are in the centre OFF position, otherwise, when refuelling begins, fuel will be directed, (forward or aft) to comply with the selection made.

   (4) All fuel tank indicator lights on the starboard console and ground refuelling panel are extinguished.

   (5) The centre console is in the retracted position to prevent operation of the press switches on the fuel system control panel during the refuelling operation. If this instruction is ignored and a push-button is pressed during refuelling the resultant current increase in the circuit will cause an interruption in the automatic sequence so that refuelling is transferred prematurely, to the next tank in sequence. This premature transfer will possibly cause the filling of the aft tanks (No.6 and 7) before the No.1 and 2 tanks are correctly refuelled (see warning 2).

   (6) Ensure that the ground electrical supply is not less than 24 volts.

2. *It is essential that the No.1 and 2 tanks are refuelled to their correct capacity before any attempt is made to refuel the remaining tanks, otherwise the aircraft will become tail heavy and overbalance.*

5. When conditions are in accordance with those detailed above, preparation for ground refuelling may begin. The correct procedure is as follows:-

(1) Ensure that a 28-volt electrical supply is available either by:-

(a) Connecting a 28-volt ground supply.

or

(b) Connecting a 112-volt ground supply and having at least one rotary inverter running.

(2) Connect the refuelling unit, or units as required, to the refuelling points on the starboard side of the aircraft. Ensure that correct bonding is made to the earth clip provided.

(3) Pull down the handle (between the refuelling points) outboard of the earth clip. This energises the stabilised voltage power pack.

(4) Check that the COMMENCE REFUELLING INDICATOR LAMP (refuelling panel) is illuminated. This indicates that the voltage power pack is stabilised.

NOTE...
The system must be allowed to warm up for a period of one minute after the COMMENCE REFUELLING lamp comes on before refuelling begins.

(5) Set the refuelling selector to the desired percentage and check that the output indicator of the power pack registers the selected percentage. If the voltmeter percentage reading is not within two per cent of the selected percentage refuelling must not begin. It will be necessary to remove the power pack from the aircraft for readjustment in accordance with the instructions in Book 2, Sect.6, Chap.1, Group Q, of this publication.

(6) Push the MASTER switch slider bar (refuelling panel) upward and check that both master switches remain in the ON position when the slider bar is released.

NOTE...
One group of tank only may be replenished if desired by selecting one master switch instead of both. ▶

(7) Operate the start switch (refuelling panel), repeatedly, until the two adjacent indicator lamps, marked 1 ON and 2 ON, illuminate.

(8) Commence refuelling by starting the refuelling unit, or units.

NOTE...
(1) As each tank refuelling valve is opened by the sequence selector the corresponding lamp on the lower half of the refuelling panel will be illuminated. These lamps are numbered from 1 to 7 inclusive.

(2) During refuelling, the contents of the tank being refuelled may be observed on the appropriate group contents gauges in the cockpit. On no account must the press switches on the fuel system control panel be operated for individual tank readings during refuelling, as this will cause damage to the contents gauge system and probably disrupt the refuelling sequence (warning 1 (5) refers).

(9) On completion of refuelling, the master switches will return to the OFF position and all indicator lamps will be extinguished, only the power pack will be operating.

(10) Remove the refuelling hoses and repeat the foregoing operations on the opposite side of the aircraft.

(11) When refuelling is complete, remove the hoses, return the micro switch handle to the horizontal position and close the access doors.

NOTE...
As a safety precaution the port access panel cannot be closed until the micro switch handle has been returned to the OFF position.

(12) Two TANK SELECTOR OVERRIDE switches, labelled NO.1 GROUP TANKS - 1, 4, 5 and 7, and NO.2 GROUP TANKS - 2, 3 and 6 must be selected if manual control of the refuelling is required. When pressed once they select the next tank in the associated group of tanks, therefore, these switches must never be operated when normal refuelling is in progress. (Refer to the warning at para.4 before selecting tanks out of sequence.

On completion of refuelling, remove the accumulation of water from the fuel tanks. The method is described in Sect.4, Chap. 2 of this publication.

CHECKING TANK CONTENTS

6. Each of the fuel tanks contains two contents gauge units suitably arranged so that the gauges, mounted below the pilot's centre instrument panel, indicate the correct reading irrespective of the attitude of the aircraft; dipsticks are not required. The contents gauges are switched on when the 28-volt BATTERY ISOLATION switch is ON; this switch is on the port side of the crew's compartment near the A.E.O's station. The gauges indicate, on their inner ring; the tank group contents. It is necessary to press the associated push switch on the fuel control panel (centre console) to read on the outer ring, the individual tank contents. The individual tank contents switch must not be pressed during refuelling, (warning 1, para.4), and at no time must more than one push switch be depressed.

ENGINE OIL TANKS

7. An oil tank, with a capacity of 6 gall. oil, 4 gall. air space (Olympus 101): 6·5 gall. oil, 3·5 gall. air space (Olympus 102) and 7 gall. oil, 3 gall. air space (Olympus 104) is integral with each engine. Replenishment is through a ½ in. B.S.P. pressure type coupling (Part No. AVX-149), located on the lower forward side of the engine, using a pressurised fluid replenishment can Mk.2(Ref.No.4G/5358). The tank contents may be checked on a downward facing gauge, on the port side of each engine, visible when a small access panel labelled ACCESS DOOR FOR OIL TANK CONTENTS GAUGE, adjacent to the engine compartment front door, is opened. On the face of the gauge, covering the 4½ to 6½ gallon calibration, is a green quadrant which covers the oil contents range for flight. Topping up is not normally required until the gauge needle falls below the quadrant

TOPPING THE HYDRAULIC RESERVOIR

8. A sighting glass is provided in the reservoir through which the oil level can be visually checked. Replenishment, using the oil specified in Leading Particulars, is through a combined charging and overflow valve mounted on a panel in the starboard inner engine bay. Escape of oil through the ¼ in. B.S.P. overflow outlet is an indication that the oil level is correct. Equipment to be used consists of a pressurised fluid replenishing can Mk.2 (Ref. No. 4G/5358). This can will require a coupling U/1367 and Avery couplings - union nut AVA.62C (Ref. No. 27BA/8767) and half coupling AVA.37C (Ref. No. 27BA/2760) - before it will fit on the charging valve.

9. Filling is to be effected under the following conditions:-

(1) Alighting gear DOWN and doors open.

(2) Bomb doors open.

(3) Brake accumulators charged - (para.10)

BRAKE ACCUMULATOR INFLATION

10. The brake accumulator air inflation points, which are standard A58 Mk.2 (or DC.22) inflation valves and associated pressure gauges are on the hydraulic component panel in the nose wheel bay. Before recharging with air, it is necessary to discharge any residual oil pressure in the accumulators. This is accomplished by pressing the manually operated valves adjacent to the charging valves until the gauges have fallen to a steady reading. Recharge, as necessary, with air to 2,500 p.s.i. using an inflation adapter (Ref. No. 4G/6246). When the engines are started, the accumulators will be charged from the aircraft hydraulic system to the maximum working pressure of 4,000 p.s.i. without further action by the servicing personnel.

11. Should the brakes be required before the engines are started, i.e., for towing or servicing purposes, charging with oil can be accomplished in the following manner:-

(1) Ensure that a 112-volt electrical supply is connected to the ground supply socket and operate the switch, labelled HYDRAULIC POWER PACK, on the starboard rear side of the nose-wheel bay, or the alternative switch; on the side panel at the edge of the port console, labelled HYD. POWER PACK MOTOR SWITCH.

(2) The switch must be released immediately after operating, as the charging of the accumulators and the subsequent stopping of the power pack follows automatically.

WARNING...
The motor of the power pack is short time rated and must not be allowed to run for more than one minute in any period of 20 minutes.
Check that no other services are selected to operate, as the power pack charges the feed line of the whole hydraulic system.

NOSE-WHEEL SHOCK-ABSORBER

12. The nose-wheel unit shock absorber is liquid sprung and is not inflated with air. Provided the C.G. position and the aircraft All-Up Weight is known the static ground load on the nose-wheel unit and the corresponding nose-wheel unit extension can be determined from fig.3. A check of the serviceability of the shock-absorber can then be made by measuring the extension (dimension X, fig.3) and compare it with the extension given for that particular nose-wheel unit loading. Alternatively it is necessary to jack the aircraft and check that the shock-absorber oil pressure (1,500 ± 50 p.s.i.) is correct in accordance with the instructions contained in Sect.3, Chap.5 of this Book.

AIR CHARGING

WARNING...
Fatal accidents have occurred owing to the mistaken use of cylinders containing oxygen etc., when charging air systems. It is emphasised that compressed air cylinders are painted light grey and cylinders of any other colour must not be used. (A.P.1464G, Vol.1, Part 2, Sect.5) refers.

General
13. When charging compressed air systems 'dry air' from approved charging cylinders, i.e., Mk.7A (Ref. No. 71A/29) or other approved sources must be used.

14. The charging connections on this aircraft are standard A58, Mk.2 (or DC.22) inflation valves, except where otherwise indicated, and the systems are recharged using a standard inflation adapter (Ref. No. 4G/6246). The method of charging high pressure air systems is detailed in A.P. 1464G, Vol.1, Part 2, Sect.5.

Emergency air system
15. Two A58, Mk.2 (or DC-22) inflation valves together with 0-4,000 p.s.i. pressure gauges are provided, on the aft bulkhead in the nose-wheel compartment, to replenish the air storage cylinders for the emergency operation of the alighting gear hydraulic system. The correct charge pressure is 3,000 p.s.i.

Pneumatic system - entrance door
16. The two cylinders of the entrance door operating pneumatic systems are charged through separate A58, Mk.2 (or DC.22) inflation valves located together with pressure gauges, one to each cylinder, on the aft face of the pressure bulkhead at the forward end of the nose-wheel compartment. The correct charging pressure is 2,000 p.s.i.

Pneumatic system - T4 bombsight
17. The air storage cylinder, which supplies air to the T4 bombsight computor, is charged, simultaneously, to a pressure of 2,000 p.s.i. with the entrance door close system. The system contents pressure gauge is situated below the door systems pressure gauges.

Pneumatic system - H2S scanner
18. The air cylinder, of the pneumatic system employed to pressurise the H2S scanner, is charged through an A58, Mk.2 (or DC.22) charging valve located, together with a pressure gauge, behind the emergency equipment access panel on the port side of the nose section. The correct charge pressure is 1,800 p.s.i.

Bogie trim jacks
19. The pressure in the bogie trim jacks may be checked using an inflation adapter

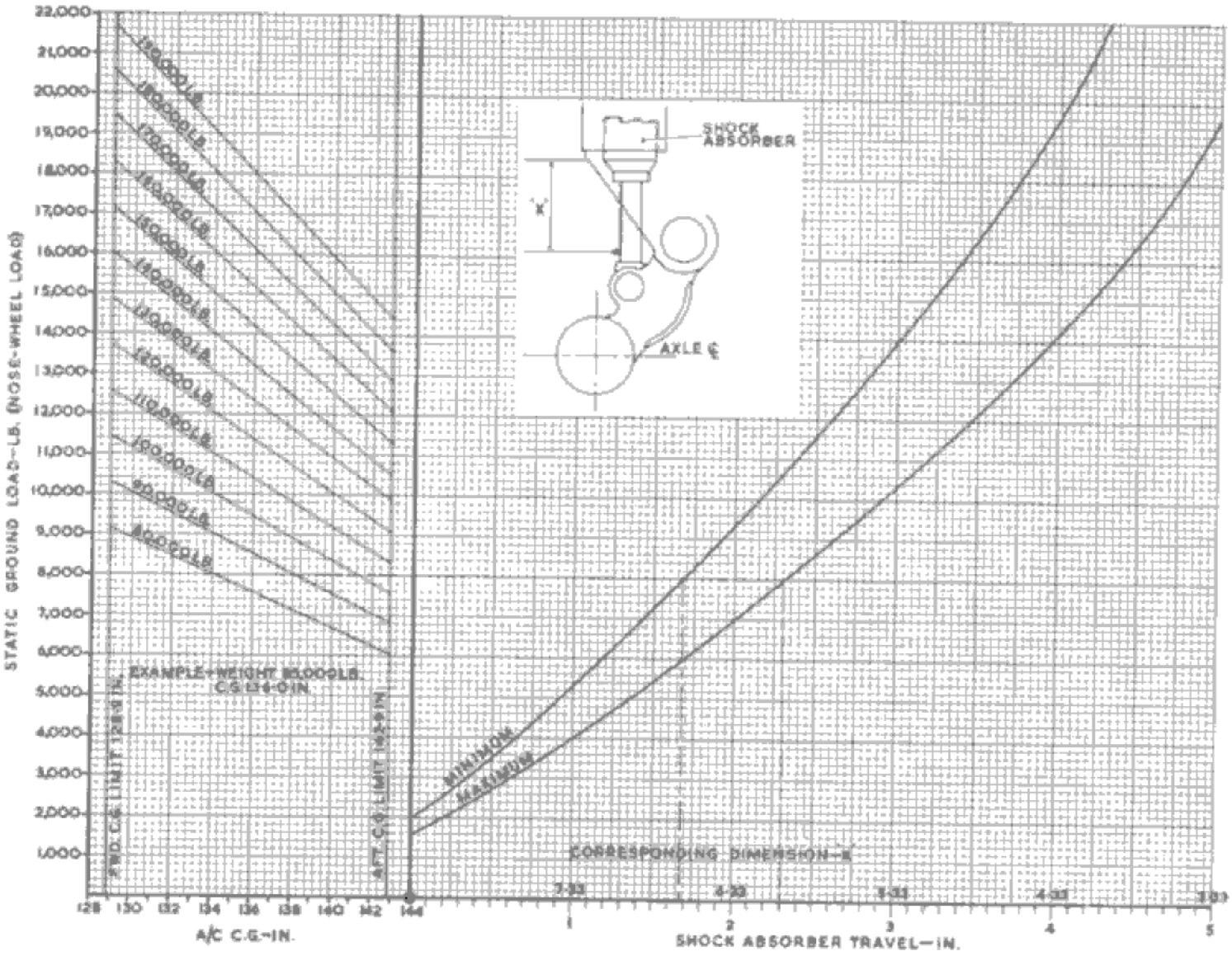

Fig. 3. Nose-wheel unit static load / deflection curve

(Additional information)

RESTRICTED

(Ref. No. 4G/6246) fitted with a 0-600 p.s.i. pressure gauge (Ref. No. 4G/3026) applied to the inflation valve (A58, Mk.2 or DC.22) located at the upper end of the main body casting, adjacent to the jury strut lugs. With all weight off the alighting gear the correct charge pressure is 200 p.s.i. (pre Mod.1211) or 344 p.s.i. (post Mod.1211). When the aircraft weight is on the alighting gear, the jack pressure will vary with the aircraft weight. The visible portion of the sliding tube can be measured as shown in fig.4 and checked against the graph curve 'A' (pre Mod.1211) or curve 'B' (post Mod.1211), given on the illustration to determine the correct inflation pressure.

Tyre inflation

20. Tyre inflation pressures are given in A.P.4505A, Vol.4. The equipment to be used is, tyre inflator H.P. Mk.1 (Ref. No.4G/5970) which, when fitted in air supply lines, allows the tyres to be inflated under controlled conditions.

OXYGEN SYSTEM

21. The oxygen system charging valve Mk.8* (Ref.No.6D/223) which has a ¼ in. dia. B.S.P. coupling, is contained within a hinged protective box marked OXY. at the aft end of the nose-wheel bay at the starboard side. Detailed information on the charging of in situ. systems using an oxygen trolley is given in A.P.1275A, Vol.1, Sect.6, Chap.3 or A.P.1275G, Vol.1, Sect.4, Chap.2. The trolley which carries an H.P. charging regulator Mk.1 or Mk.2 and several oxygen cylinders, is connected to the aircraft charging valve by a length of H.P. flexible tube Mk.2B or 2C (Ref.No.6D/1696 or 6D/1703) fitted with a swivel union nut Type 31A (Ref. No.6D/1082). Charging should be continued until, with the regulator stop valve closed, the L.P. gauge on the regulator indicates a pressure of 1,900 p.s.i. This provides for the correct pressure of 1,800 p.s.i. when the oxygen has cooled.

NITROGEN SYSTEM

22. The nitrogen cylinders are replen-

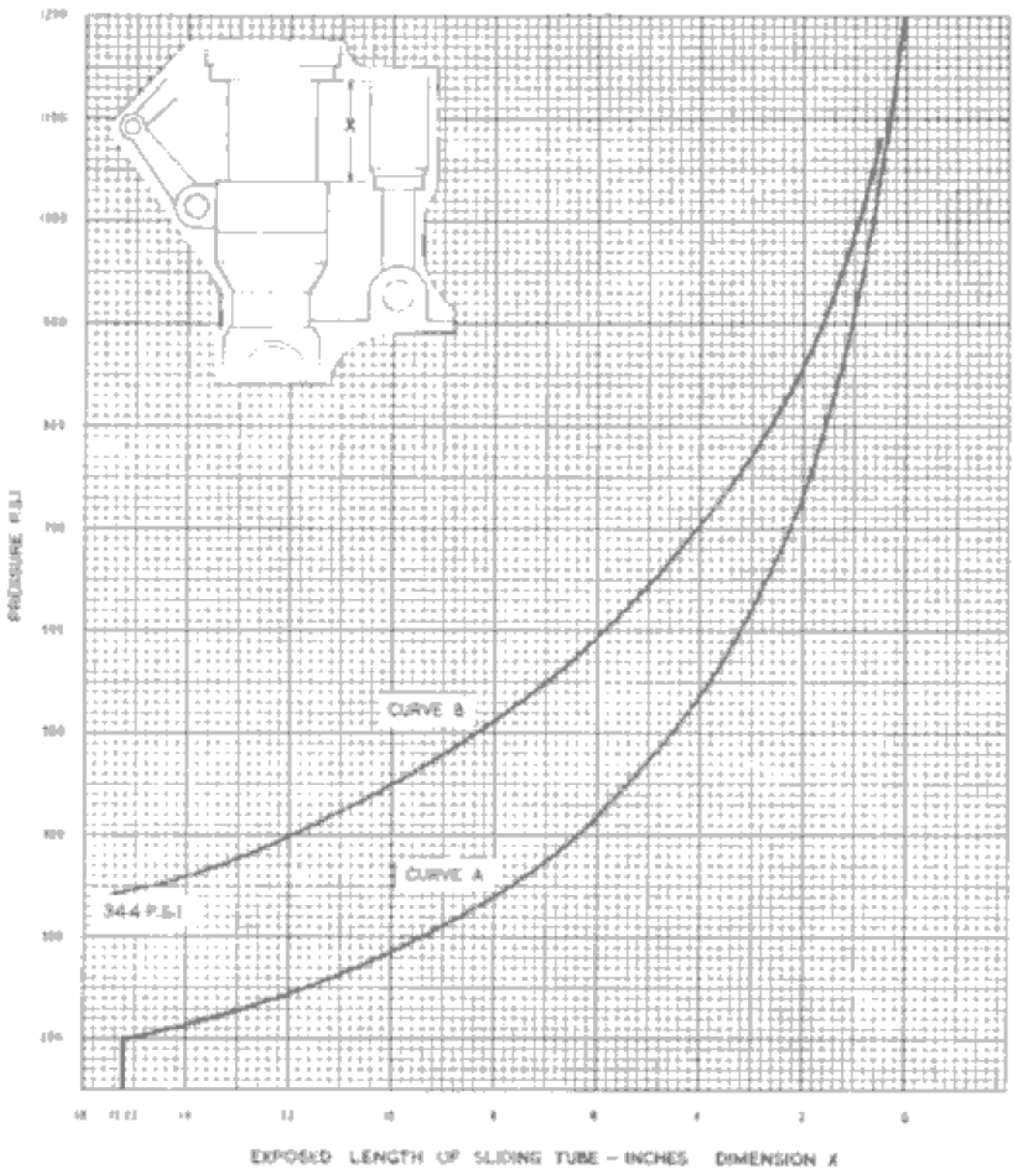

Fig.4. Bogie trimmer jack inflation graph

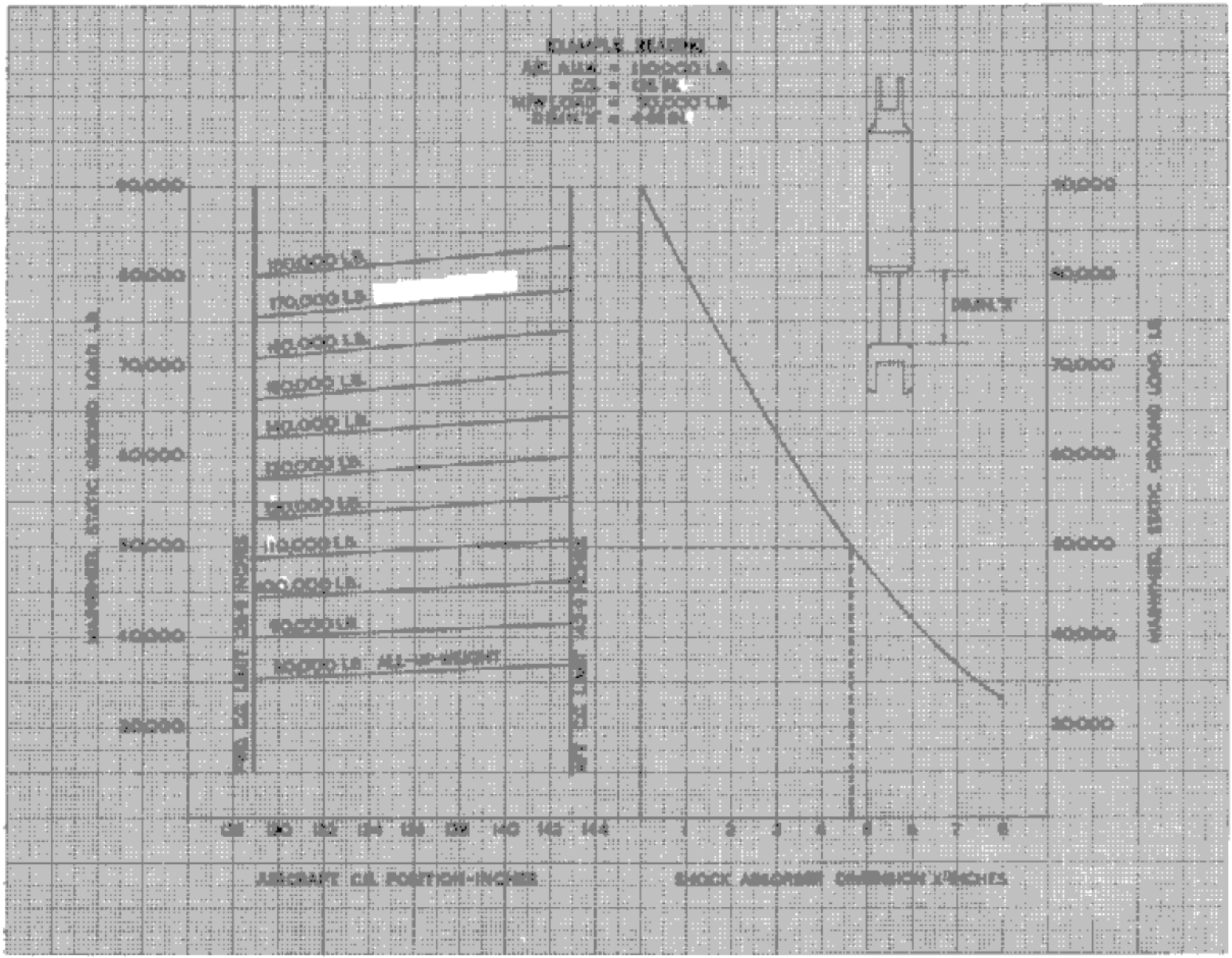

Fig.5. Main-wheel unit static load/deflection curve

(◂ *Additional information* ▸)

ised in situ. through a charging valve Mk.8B, (Ref.No.6D/796) located in each main-wheel bay. The external charging equipment is similar to that described in the preceding paragraph for the oxygen system, except for the different end connections and the colour of the charging cylinders. The external charging equipment is connected to the Mk.8B charging valve by a flexible hose assembly Mk.2, (Ref.No.6D/801), which has a longer charging connection than the oxygen hose to prevent personnel accidently connecting the replenishment equipment to the wrong system. The correct charge pressure is 1,800 p.s.i. Information on the charging of in situ. systems is given in A.P.1275A, Vol.1, Sect.10.

NITROGEN PURGE - FLIGHT REFUELLING

23. The flight refuelling nitrogen purge system storage cylinder is charged to 1,800 p.s.i. through a Mk.8B charging valve, (Ref.No.6D/796), located in the charging recess on the starboard side of the metal nose section. Information is given in A.P.1275A, Vol.1, Sect.10 and the charging equipment is described in para.22 of this chapter.

DE-ICING SYSTEM - WINDOWS

24. Access to the de-icing system fluid tank is through a hinged, circular panel with a press catch release and situated in the starboard side of the metal nose section (pre Mod.549) and the centre of the metal nose section (post Mod.549). Before replenishing the tank, CLOSE the pneumatic system ground isolation cock, which is mounted at the rear of the entrance door aperture and protected by a red painted cover. After the shut-off cock is closed, open the access panel and release the pressure in the tank by depressing the Schrader type valve in the centre of the filler cap. The screwed filler cap can then be removed using the spanner, (Ref.No.26DC/95299) and the tank replenished using the fluid specified in Leading Particulars. Fit the filler cap when filling is complete and finally open the pneumatic system shut-off cock.

MAIN-WHEEL SHOCK-ABSORBER

25. Provided the C.G. position and the aircraft All-up Weight is known the static ground load on the main-wheel unit and the corresponding main-wheel unit shock-absorber extension can be determined from fig.5. A check of the serviceability of the shock-absorber can then be made by measuring the extension (dimension X, fig.5) and comparing it with the extension given for that particular main-wheel unit loading. Charging of the main-wheel unit shock-absorber is given in A.P.1803E, Vol.1, Sect.3, Chap.8.