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A.L.158, Apr.77

SECTION 2

# GROUND HANDLING AND PREPARATION FOR FLIGHT

LIST OF CHAPTERS OVERLEAF

A.P.101B-0407-1A
A.L.191,Mar.83

SECTION 2

# GROUND HANDLING AND PREPARATION FOR FLIGHT

## LIST OF CHAPTERS

**Note:-** *A list of contents appears at the beginning of each chapter*

# Chapter 1 GROUND HANDLING

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## LIST OF ILLUSTRATIONS

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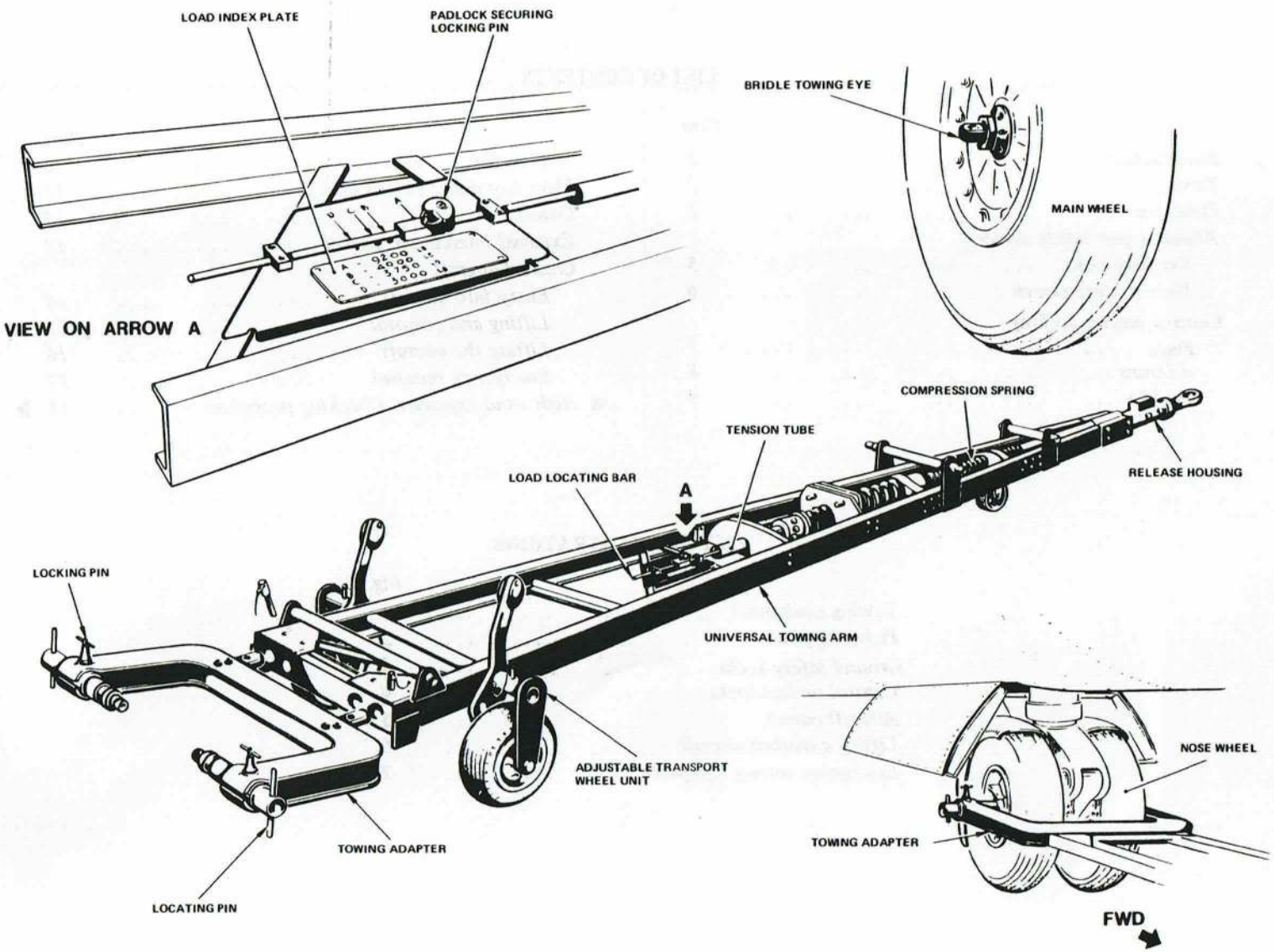


**FIG.1. TOWING EQUIPMENT**

**WARNING**

**The relevant safety precautions detailed on the LETHAL WARNING marker card must always be observed before entering the cabin or performing any operations upon the aircraft.**

**Introduction**

1. Information on the general handling of the aircraft on the ground is given in this chapter, The equipment necessary for ground handling is listed in Chapter 4 of this section.

**Towing** *(fig.1)*

2. Normal towing is from the nose-wheel axle, the towing gear consisting of a towing arm *(Chap.4, Table 2)* adapted to suit the axle by fitting an adapter *(Chap.4, Table 1)*. A release mechanism is incorporated in the towing arm to prevent damage to the nose undercarriage in the event of an overload during towing. With the locking pin inserted at the correct position (A, on the load index plate on the towing arm) the release mechanism operates at a pull-off load of 9200 lb. The towing equipment is fully described in A.P.119K-0704-15F6A (towing arm) and A.P.119K-0710-15F (towing bridle). The aircraft may, if necessary, be towed either forward or backward from the main wheel axles by attaching a 50 ft towing bridle to the towing eyes on the axles; when towing from the main wheels the aircraft is steered with a steering arm attached to the nose-wheel axle. During all towing operations, the cockpit must be occupied by a tradesman qualified to operate the brakes as necessary.

**Note . . .**

*The wheel brake system hydraulic pressure must not be permitted to fall below 2200 lbf/in² during aircraft towing.*

**Picketing** *(fig.2)*

3. The aircraft must, where possible, be picketed facing into wind. The nose is to be picketed using 12 mm dia. Polypropylene 'Nelson' rope of suitable length. Ref.No.32A/5256204. Chocks must be positioned fore-and-aft of each wheel, securely chained and tensioned at all times until the aircraft is being prepared for flight, the aircrew have entered and effective wheel braking has been applied. The following additional safety precautions must be observed:-

(1) For wind speeds greater than 25 knots:-

(a) Fit the rudder lock *(para.9)*.

(b) Fit the elevator lock *(para.10)*.

(2) For wind speeds greater than 35 knots additionally:-

(a) Fit the aileron locks *(para.8)*.

(b) If the aircraft is more than 10 deg out of alignment, nose into wind, fit the nose picket.

(3) Wind speeds between 50 knots and 80 knots additionally:-

(a) Fit nose wheel picket.

(b) Fit main wheel pickets.

(c) Fit the secondary pickets.

**CAUTION . . .**

**Design requirements do not cater for the aircraft structure to be capable of withstanding loads from picketing at wind speeds in excess of 80 knots.**

4. The main points of anchorage are at the nose undercarriage, where a lashing is placed over the stay link lugs on the shock absorber strut, and at each main undercarriage unit, where a lashing is coupled to a detachable ring-bolt, screwed, from outboard, into the upper hinge-pin of the torque linkage; these points are closed by cover plates in the undercarriage fairings, when not in use. Three secondary points are also provided, one in the underside of each main plane, where screwed holes for detachable ring-bolts are provided in the main spars, a third screwed hole is provided at frame 42 in the lower surface of the rear fuselage; when not in use, these holes are closed by screwed plugs. All lashings must be properly secured to ground anchors. The picketing ring-bolts are stowed inside the rear fuselage, on the port side above the rear access hatch.

**Note . . .**

*1. Whenever the aircraft is parked out in the open for any long period, e.g. overnight, the tail plane should be left in the fully nose down trim position. This will prevent condensation forming on the exposed part of the actuator jack with the consequent risk of icing on a subsequent flight.*

*2. Whenever the aircraft is likely to be subjected to an accumulation of snow on the main and tail planes, it must be picketed at the nose wheel.*

**Alighting gear safety devices**

*External locks (fig.3)*

5. The alighting gear safety locks must always be fitted before any ground handling is commenced and must only be removed immediately prior to flight. The main undercarriage locks comprise two U-shaped sleeves which are fitted, one to each main undercarriage jack piston rod, between the jack body and the piston rod end fitting; they are secured by quick-release pins which, with the sleeves, encircle the jack piston-rods. The nose undercarriage is locked by inserting a quick-release pin into a hole in the lower end of the radius rod; this prevents the lock lever disengaging the nose of the stay link. When not in use, the locks are stowed in the centre camera bay.

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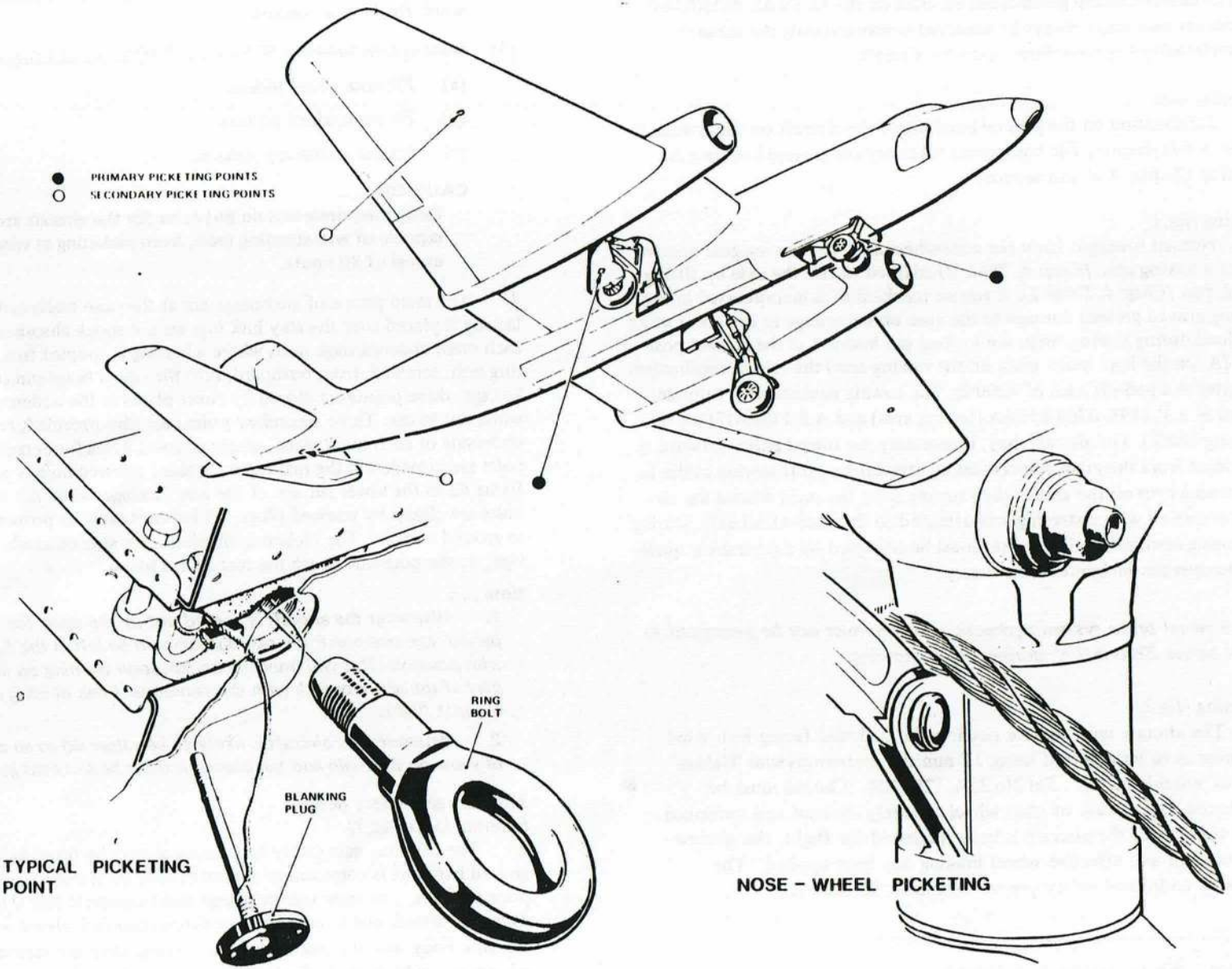



FIG.2. PICKETING POINTS

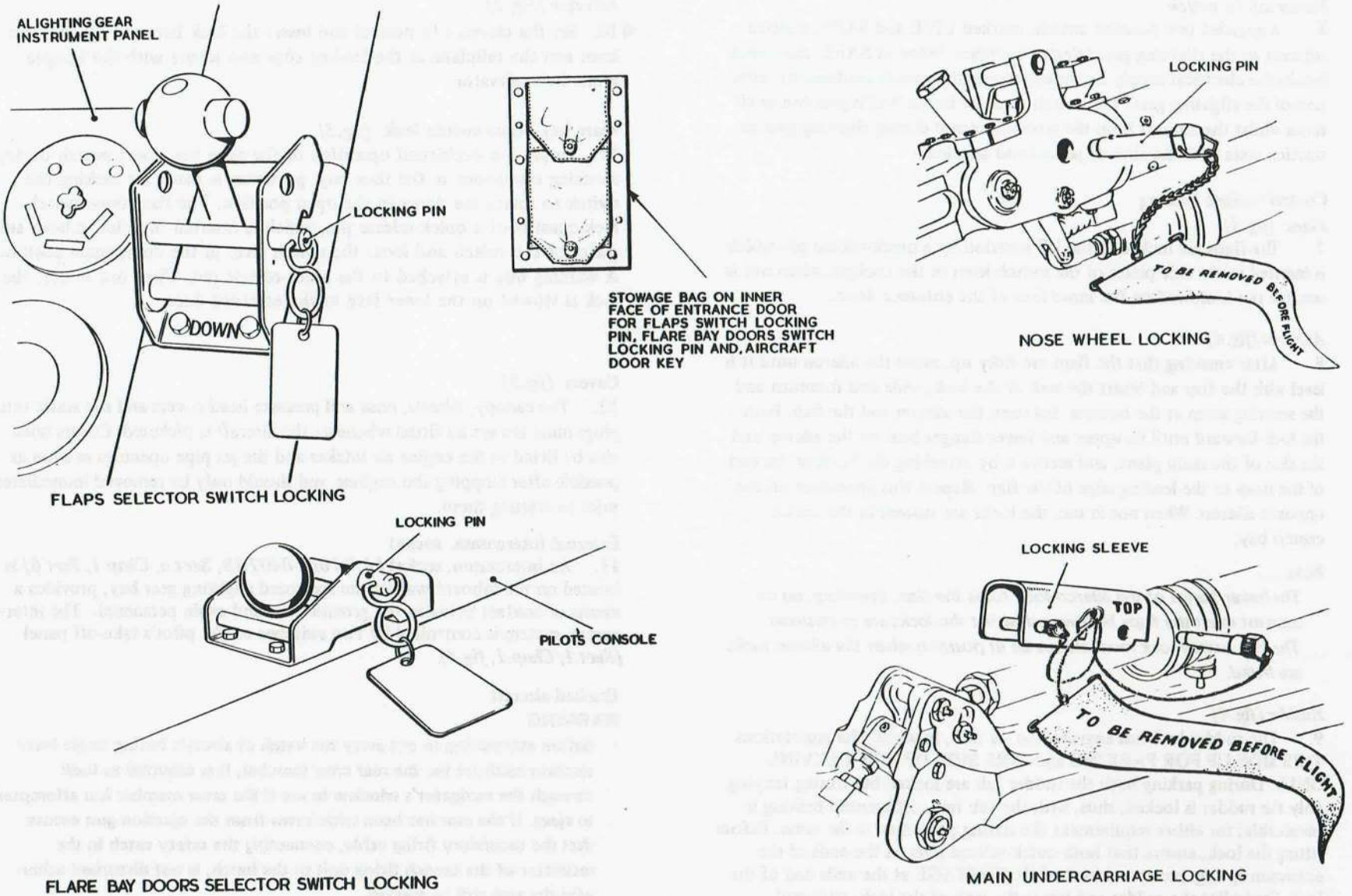



FIG.3. GROUND SAFETY LOCKS

*Master safety switch*

6. A guarded two position switch, marked LIVE and SAFE, is fitted adjacent to the alighting gear selector switches. When at SAFE, the switch breaks the electrical supply to the selector and prevents inadvertent retraction of the alighting gear. The switch must be in the SAFE position at all times whilst the aircraft is on the ground, except during alighting gear retraction tests with the aircraft jacked and trestled.

**Control surface locking**

*Flaps (fig.3)*

7. The flaps are locked in the UP position by a quick-release pin which is inserted in the side plates of the switch lever in the cockpit; when not in use, the pin is stowed on the inner face of the entrance door.

*Ailerons (fig.4)*

8. After ensuring that the flaps are fully up, move the aileron until it is level with the flap and insert the web of the lock, wide end foremost and the securing strap at the bottom, between the aileron and the flap. Push the lock forward until its upper and lower flanges bear on the aileron and the skin of the main plane, and secure it by attaching the hook at the end of the strap to the leading edge of the flap. Repeat this procedure on the opposite aileron. When not in use, the locks are stowed in the centre camera bay.

**Note . . .**

*The lower flange of the aileron lock fouls the flap, therefore, on no account must the flaps be lowered whilst the locks are in position. The flap switch lock must always be in position when the aileron locks are fitted.*

*Rudder (fig.4)*

9. The rudder lock has engraved on its web, in white, the annotations THIS SIDE UP FOR PARKING and THIS SIDE UP FOR TAXYING ONLY. During parking both the rudder tab are locked but during taxying only the rudder is locked, thus, with the tab free, differential braking is obtainable; for either requirement the fitting procedure is the same. Before fitting the lock, ensure that both quick-release pins on the ends of the extension springs are secure in the PIN STOWAGE at the wide end of the lock. Centralize the rudder and insert the web of the lock, wide end foremost, between the bottom of the rudder and the top of the rudder stub. Push the lock forward until its flanges bear on both sides of the rudder and stub, remove the starboard quick-release pin from the PIN STOWAGE and insert it into the hole in the starboard side of the rudder. When not in use, the lock is stowed in the centre camera bay.

*Elevator (Fig.4)*

◀10. Set the elevator to neutral and insert the lock between the elevator horn and the tailplane at the leading edge and secure with the bungee around the elevator. ▶

**Flare bay doors switch lock** *(fig.3)*

11. To prevent accidental operation of the flare bay doors switch during servicing operations in the flare bay, provision is made for locking the switch to retain the doors in the open position. The flare door switch lock consists of a quick-release pin, which is inserted in holes in both side plates of the switch and locks the switch lever in the doors open position. A warning disc is attached to the quick-release pin. When not in use, the lock is stowed on the inner face of the entrance door.

**Covers** *(fig.5)*

12. The canopy, wheels, nose and pressure head covers and the static vent plugs must always be fitted whenever the aircraft is picketed. Covers must also be fitted to the engine air intakes and the jet pipe openings as soon as possible after stopping the engines, and should only be removed immediately prior to starting them.

**External intercomm. socket**

13. An intercomm. socket *(A.P.101B-0407-1B, Sect.6, Chap.1, Part 6)* is located on the inboard wall of the starboard alighting gear bay, provides a means of contact between the ground crew and cabin personnel. The intercomm. system is controlled by two switches on the pilot's take-off panel *(Sect.1, Chap.1, fig.3).*

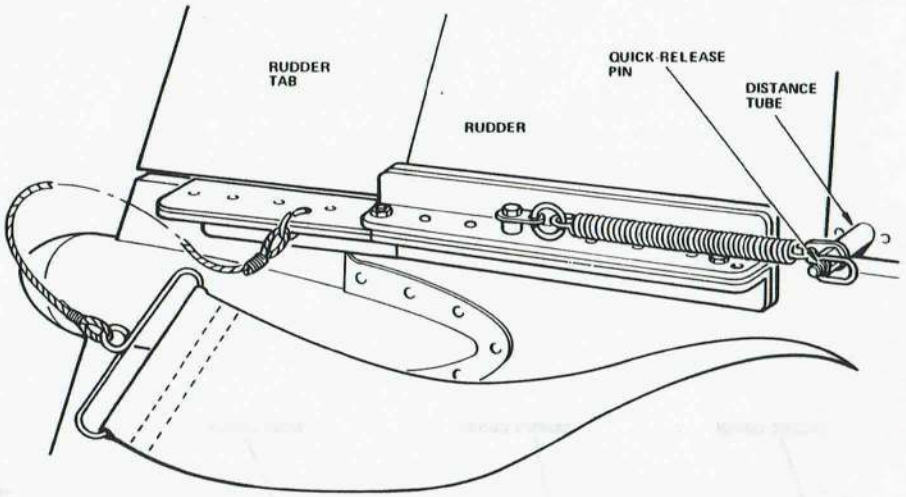
**Crashed aircraft**

**WARNING**

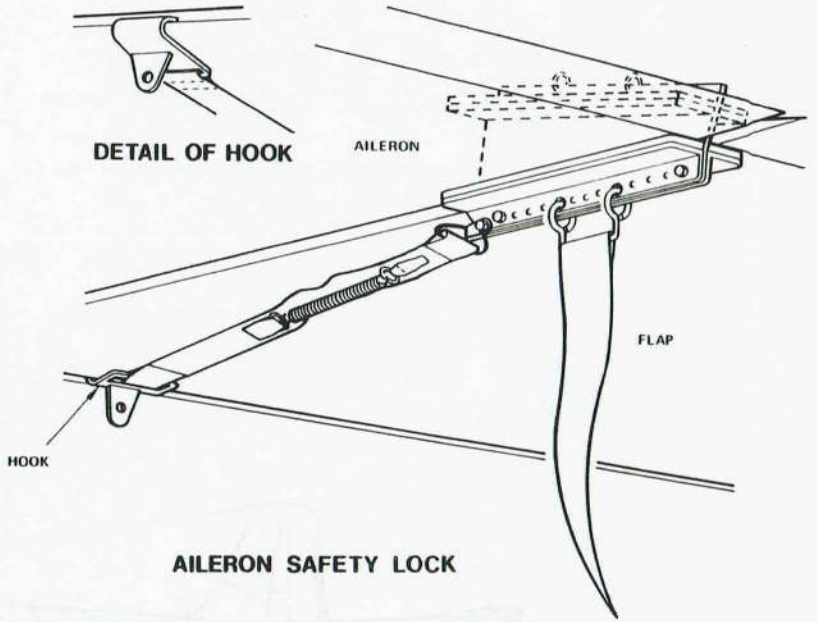
**Before attempting to cut away the hatch of aircraft having single-lever ejection facilities for the rear crew member, it is essential to look through the navigator's window to see if the crew member has attempted to eject. If the sear has been withdrawn from the ejection gun ensure that the secondary firing cable, connecting the safety catch in the restrictor of the breech firing unit to the hatch, is not disturbed otherwise the seat will be ejected.**

*Entry into aircraft*

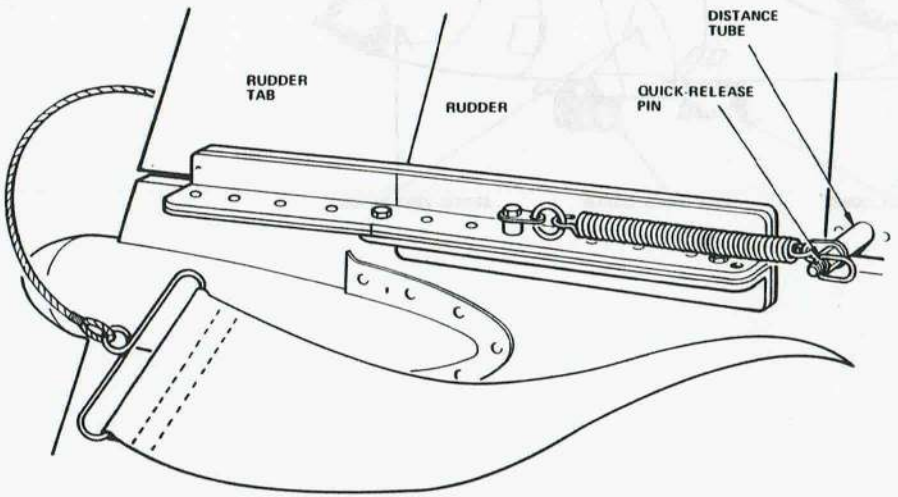
14. In the event of normal entry being impossible, the aircraft may be entered by cutting away, with an axe or other suitable implement, the navigator's escape hatch or the pilot's canopy; these areas are marked by yellow painted broken lines.



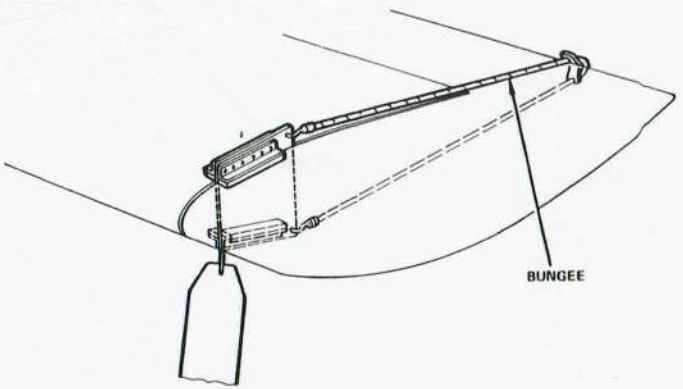

RUDDER SAFETY LOCK - TAXYING




AILERON SAFETY LOCK




RUDDER SAFETY LOCK - PARKING




ELEVATOR SAFETY LOCK

**FIG. 4 CONTROL SURFACE LOCKS**

◀*UFR/C/299 embodied*▶

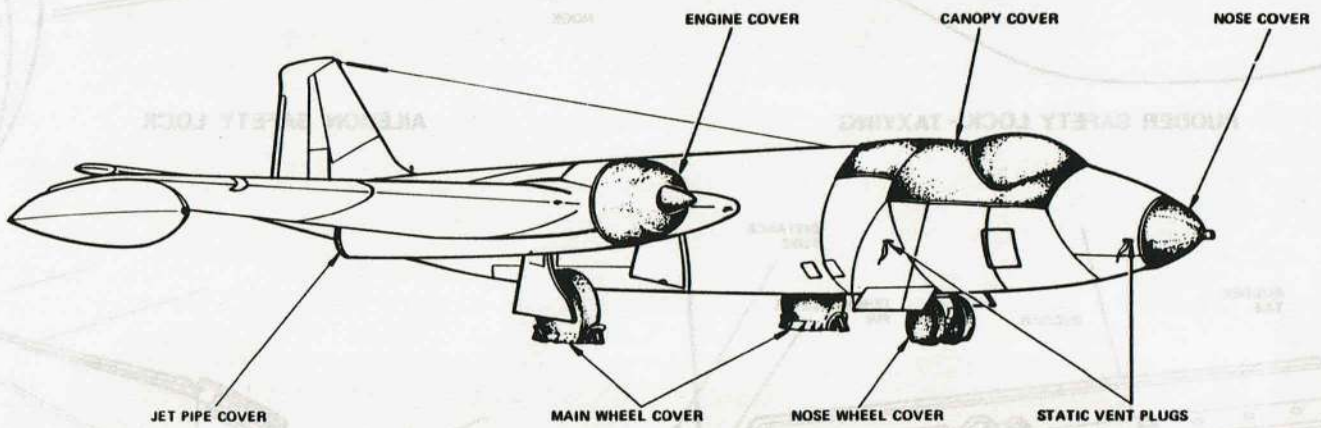



**FIG. 5 AIRCRAFT COVERS**

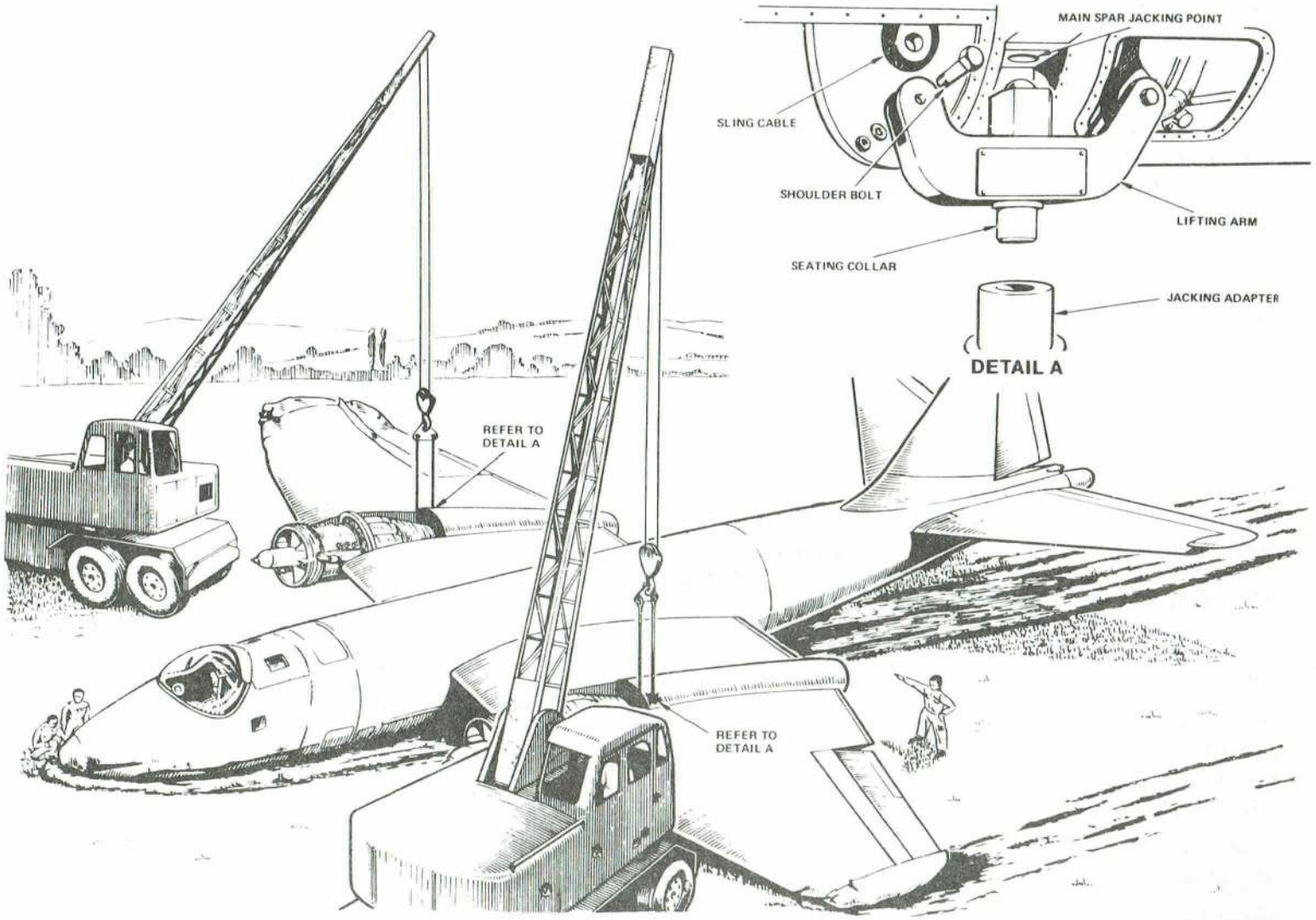



FIG.6. LIFTING A CRASHED AIRCRAFT

*Lifting and removal*

**15.** The exact method of lifting and removing the aircraft, and the equipment to be used will depend entirely upon local conditions and requirements. General information, a description of equipment, and suggested methods are given in A.P.119Q-0200-16.

**WARNING**

**Before the commencement of lifting operations, refer to the current regulations relating to crashed aircraft, and take the following precautions:-**

**1. The ejection seat cartridges must be removed or the firing mechanism made safe as detailed in A.P.109A-0001-1.**

**2. Disconnect all batteries including emergency batteries.**

**3. All explosives must be made safe and removed.**

**4. The fuel remaining in the tanks should be removed by means of hoses inserted through the filler cap orifices.**

*Lifting the aircraft (fig.6)*

**16.** Should it be possible to lift the aircraft by cranes or gantries, the following methods may adopted. A complete set of slings *(Chap.4, Table 1)* is capable of lifting an aircraft at its maximum all up weight. If, owing to crane limitations, this weight is beyond the combined capacity of the cranes available, the weight of the aircraft must be reduced accordingly.

(1) Remove the top cowling, service panel, and bottom cowling from each engine.

(2) Open the main spar jacking point access panel and remove the detachable panel immediately aft of this point.

(3) Cut through the top jet pipe cowl on the outboard side aft of the main spar to provide access for the sling cable.

(4) Position the cranes at each outer wing leading edge immediately outboard of the engines. Ensure that the cranes are positioned on good solid ground, or suitably supported by sleepers, etc.

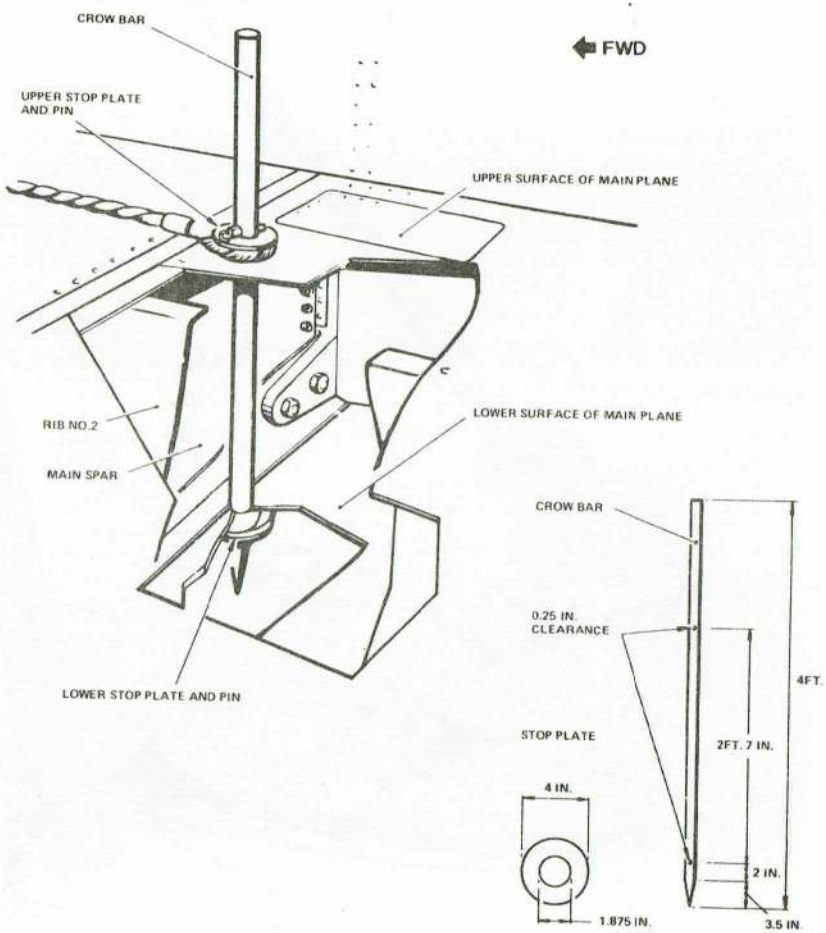



**Fig.7. Emergency towing equipment**

(5) Anchor the tail of the aircraft to prevent swinging but allowing enough slack in the line for lifting.

(6) Lower the slings with one cable each side of the engine firewall until the cable ends protrude beneath the engine cowlings.

(7) Attach the lifting arms to the cables *(detail A)* with the shoulder bolts Part No.EA3.88.317, ¾ in. Whitworth hexagon nuts and special washers Part No.EA3.88.319 and raise the slings until the spherical head on the lifting arm engages in the main spar jacking point.

(8) Raise the aircraft and position a 10-ton hydraulic jack and Mk.1 trestle *(Chap.4, Table 2)*, suitably supported on a firm foundation, with a Mk.48 adapter head *(Chap.4, Table 2)* beneath each main plane jacking point.

(9) Lower the aircraft until the seating collar on the lifting arm is engaged with the jack adapter.

(10) Retaining tension on the slings, trestle the fuselage as instructed in Sect.2, Chap.4.

*Emergency removal*

**17.** One method of removing crashed aircraft from runways is as follows:-

(1) Equipment required *(fig.7)*

(a) Two locally manufactured crow bars. Make from steel bar, 1½ in. dia., Ref. No.30A/9610622.

(b) Four locally manufactured stop plates. Make from 6 s.w.g. steel sheet, Ref. No.30A/9610795.

(c) Four quick-release pins, Ref. No.27FT/1200982.

◀ (d) Two soft towing bridles (Ref. No.4GB/4409987) fitted with one ¾ in. shackle (Ref.No.28Y/1057116) and shackle pin (Ref. No.28Y/9508299) on each end. ▶

(e) Sledge hammer, Ref. No.1B/9104699.

(f) Suitable towing/winching vehicles.

(2) Preparation *(fig.7)*

(a) Place the point of a crow bar on the inboard front corner of the main spar access panel and, using a sledge hammer, drive the crow bar through the top panel.

(b) When the crow bar has penetrated the upper access panel and entered the main plane, thread a towing bridle shackle and stop plate over it, and fit a quick-release pin.

(c) Locate the point of the bridle attachment bar on the inner surface of the lower access panel and force the bar through the main plane until the upper quick-release pin prevents further penetration.

(d) Thread the other shackle end of the towing bridle, and the stop plate over the protruding lower end of the crow bar, and secure with a quick-release pin.

(e) Repeat this operation on the opposite main plane.

(3) Removal

Connect the towing bridles to a suitable vehicle and tow/winch clear.

◀ **CAUTION . . .**

**TO MINIMISE THE RISK OF DAMAGE TO FLYING CONTROLS CAUSED BY HIGH WINDS, CONTROL LOCKS MUST BE FITTED WHENEVER THE AIRCRAFT IS PARKED IN THE OPEN.**

**Note . . .**

*Control locks may not necessarily prevent high winds from damaging the control systems and surfaces.*

**High wind exposure. Checking procedure**

**18.** Aircraft which have been exposed to wind speeds in excess of 25 knots must be examined before the next flight in accordance with the following procedure.

(a) Examine all control locks. Ensure they are still correctly fitted and the controls still correctly locked.

(b) Remove the locks. Examine the locks for signs of strain or damage. ▶

◀ Any defects found during the checks (a) or (b) will render the aircraft unserviceable. Continue to check the relevant control systems as follows.

(c) Ensure free operation of the controls over the full range of movement.

(d) Examine the control surfaces primary limit stops and their attachment brackets. Ensure there are no fractures, distortion or signs of strain.

Any defects found during checks (c) or (d) will require a detailed investigation of the flying control systems. Continue to check the relevant control systems as follows.

19. Commence in the cockpit. Examine the control column and rudder pedals. Then work outward along the main planes and rearward along the fuselage, carefully examining the following points of the flying controls system.

(a) Pivot pins and fulcrum bolts. Check for excessive wear, distortion and signs of stress.

(b) Rivets and bolts securing brackets and fairleads. Check for looseness, distortion and signs of shear.

(c) Secondary limit stops and their attachment brackets. Check for fractures, distortion and signs of strain.

(d) Control rods. Check for fractures, distortion and signs of strain.

(e) Control surface fairings. Check for damage resulting from harsh or excessive movements.

(f) Control surfaces. Examine. Especially in the vicinity of the hinge brackets. Check for damage and distortion.

(g) Controls actuating arms and levers. Check for fractures, rivet failure and signs of distortion. ▶

# Chapter 2 PREPARATION FOR FLIGHT

## LIST OF CONTENTS



## LIST OF ILLUSTRATIONS

**WARNING**

**Before entering the cabin, personnel must read the LETHAL WARNING marker card at the front of this volume, and ensure that the relevant precautions detailed there are strictly observed.**

**Introduction**

1. This chapter gives information upon the general preparation of the aircraft for flight. Access to the fuel tanks and other replenishing points are illustrated in figs.2 and 3.

**Refuelling**

2. No.1 and 5 fuel tank fillers are located in the top surface of the fuselage and the integral tank fillers are in the upper surface of the main planes. No.6 tank filler is on the starboard side of the fuselage and the wing tip tanks fillers are in their upper surfaces.

**Refuelling/defuelling precautions**

3. It is essential that the following precautions are observed when refuelling, or defuelling the aircraft:-

(1) Verify the correct type of fuel to be used.

(2) Prior to removing the filler caps, ensure that the fuel hose and refueller are correctly earthed.

(3) On no account drain No.1 2, 3 and 4 tanks while fuel remains in No.5 tank, without supporting the fuselage at frame 42. When refuelling, fill No.1, 2, 3 and 4 tanks first, when defuelling, always drain No.1, 2, 3 and 4 tanks last.

(4) When refuelling the main plane integral tanks, fill the inboard compartment of each tank first and secure the filler cap before attempting to fill the outboard compartment.

(5) The tanks must be filled only from a refueller fitted with a streamline filter.

**Checking the tank contents**

4. The fuel tanks are fitted with capacitor-type fuel contents gauges which indicate correct readings irrespective of the attitude of the aircraft; dipsticks are not required. The gauge indicators register the tank contents when the BATTERY ISOLATION SWITCH on the pilot's take-off panel is switched on or when an external supply is connected to the external electrical supply socket (para.13).

**Checking the accessories gearbox oil level**

5. The accessories gearbox oil dipstick is located in the top of the gearbox and is accessible after removing a panel in the main plane *(Sect.2, Chap.4)*. If the oil level is lower than the FULL mark on the dipstick

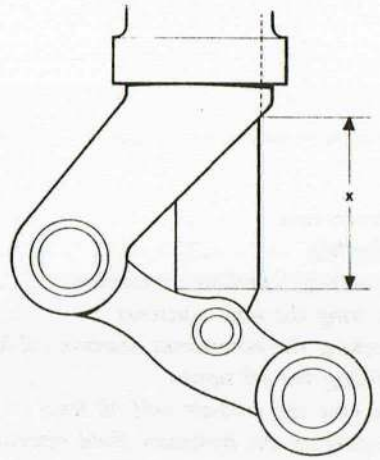



**Fig.1. Nose undercarriage shock-absorber extension**

the gearbox should be replenished through the filler cap adjacent to the dipstick, with oil as specified in Leading Particulars.

**Note . . .**

*The gearbox and sump oil has a deleterous effect on paint, rubber, electric cables etc., care must be taken to avoid spillage on such parts.*

**Refilling the oil sumps**

6. The oil sump filler caps *(fig.3)* are accessible through removable panels *(Chap.4)*. Refer to Leading Particulars for the correct type of oil. To refill or top-up:-

*After the system has been emptied*

(1) *No.1. engine*

(a) With the aircraft standing on level ground, fill the sump to approximately 1½ in. below the seal face of the sump filler neck.

(b) Run the engine for 2 minutes at idling rev/min to circulate the oil.

(c) After stopping the engine, allow sufficient time to elapse for the oil in the system to drain back into the sump (approximately 10 minutes), after which, top up to the level as in (1) (a).

(2) *No.2. engine*

(a) With the aircraft standing on level ground, fill the sump to approximately ½ in. below the seal face of the sump filler neck.

(b) Repeat (1) (b).

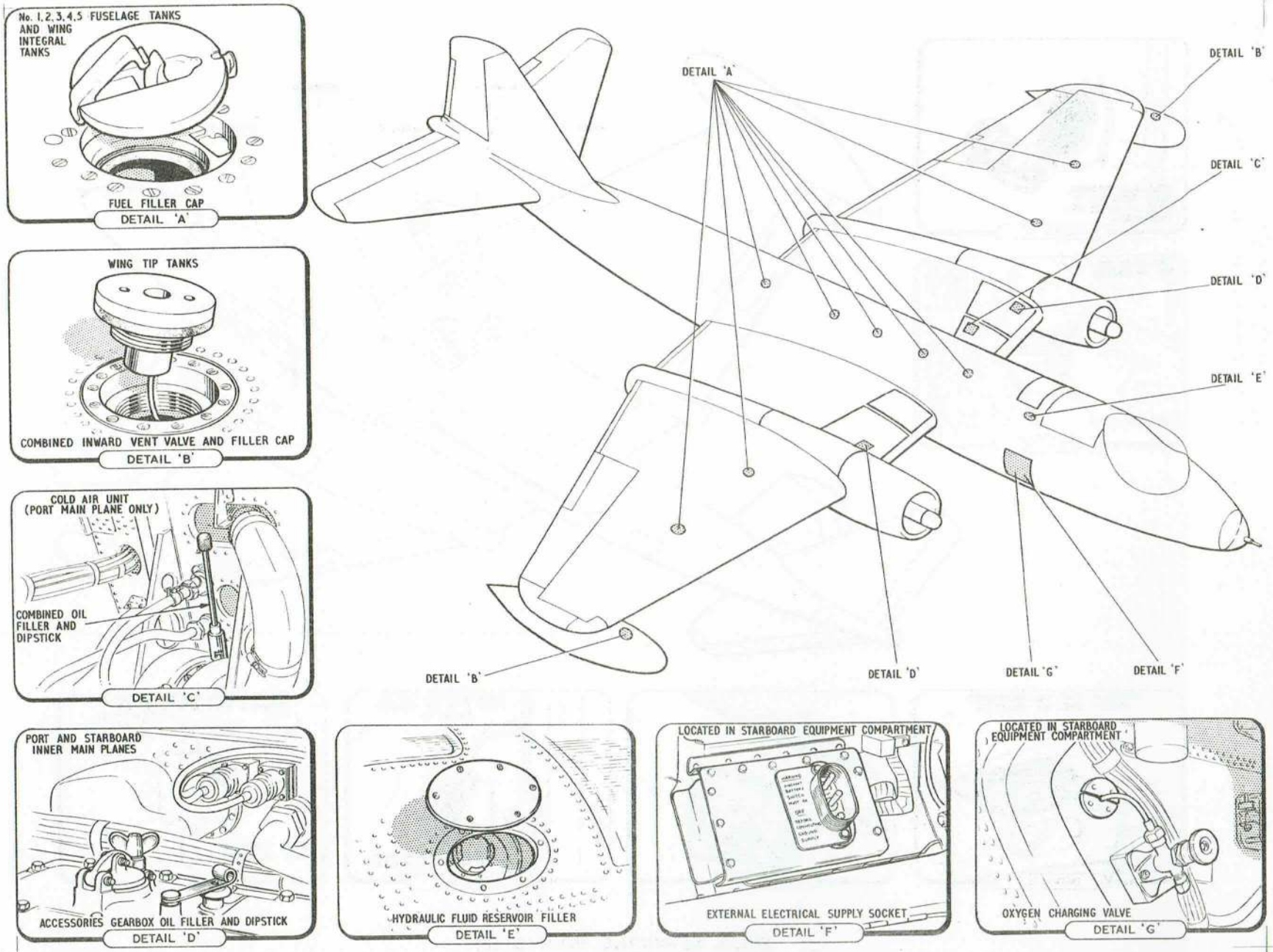



FIG. 2. SERVICING POINTS (1).

◀DETAILS B AND C AMENDED▶

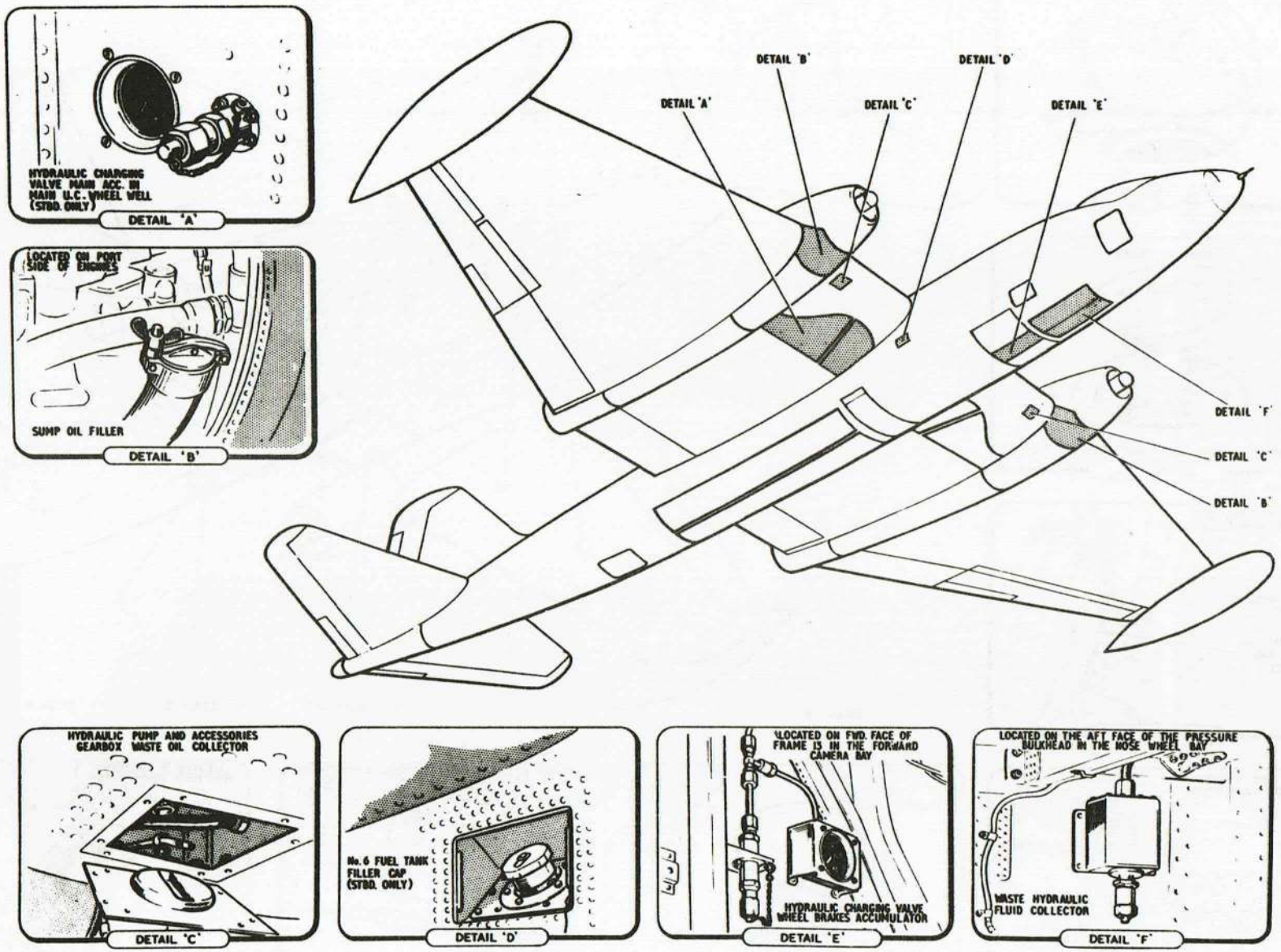



FIG. 3. SERVICING POINTS (2)

751.

(c) After stopping the engine, allow sufficient time to elapse for the oil in the system to drain back into the sump (approximately 10 minutes), after which, top up to the level as in (2) (a).

(3) *Intermediate topping up*
The levels referred to in (1) (a) and (2) (a) are to be rigidly observed.

**Checking the cold-air unit oil level**

7. The combined oil filler and dipstick is located in the top of the cold-air unit and is accessible after removing a panel in the port inner main plane *(Sect.2, Chap.4)*. If the oil level is lower than the FULL mark on the dipstick, replenish with oil OEP-71.

**Note . . .**

***Pour oil slowly into the filler neck allowing a few minutes for it to settle before checking against the dipstick. The oil level is critical, do not overfill.***

**Topping up the hydraulic fluid reservoir**

8. An elliptical panel in the upper surface of the fuselage, aft of the crew escape hatch, provides access to the hydraulic reservoir filler cap. The reservoir should be topped up to the maximum possible level with fluid as specified in Leading Particulars; a drainpipe is provided for fluid spilt through overfilling. It is important that hydraulic pressure is exhausted from the main accumulator by operating the flaps or the bomb-bay doors until no further movement can be obtained, and from the brakes accumulator by operating the wheel brakes.

**WARNING . . .**

**Before operating the flap selector, ensure that aileron locks are not fitted. Refer to the note in Chap.1 of this section.**

8A. Before topping-up the reservoir ensure that the pressures shown on the accumulator pressure gauges *(para.9 and 10)* agree with those given in Leading Particulars, when the respective system is exhausted. If the pressure shown is in excess of the given figure it is an indication that fluid is still contained in the respective accumulator. If the pressure is below the given figure the accumulator must be recharged *(para.9 and 10)*. Also before filling, ensure that the alighting gear is down, the bomb-bay doors open and the air brakes in. The flaps may be in either the fully up, or fully down positions.

**Hydraulic accumulator inflation**

9. The hydraulic accumulator inflation point is adjacent to the hydraulic accumulator in the starboard undercarriage well, together with its pressure gauge. The correct inflation pressure is given in Leading Particulars

**Brakes accumulator inflation**

10. The brakes accumulator inflation point and pressure gauge are on the forward face of the forward camera bay rear bulkhead, and are accessible through the door of that bay. The correct inflation pressure is given in Leading Particulars.

**Oxygen system**

11. The oxygen charging valve is located in the starboard equipment compartment; it is accessible through the bay access door on the starboard side of the fuselage. The charging procedure is described in A.P.107D-0001-1.

**Battery isolating switch**

12. As a number of electrical circuits are without switches and fed directly from the main positive supply, an isolating switch is fitted to prevent battery drain when the aircraft is on the ground with the engines stopped. The switch is located on the pilot's take-off panel, and must be switched OFF immediately after stopping the engines.

**External electrical supply socket**

13. The external electrical supply socket is located on the main electrical panel on the starboard side of the fuselage. Access is through a door in the lower side of the fuselage, aft of the entrance door.

**Pilot's take-off panel**

14. The take-off panel is located on the port wall of the pilot's cabin. All the switches mounted on this panel must be UP prior to flight

**Canopy de-misting**

15. Windows provided in the air-drier tubes, connected to the canopy and the plastic nose, permit visual inspection of the contents of 'telltale' compartments. The desiccant used in the air-driers is silica gel, which should be changed when it becomes pink.

**Note . . .**

*Silica gel is blue, when dry.*

**Alighting gear inflation**

◀ 16. The inflation pressure of the main undercarriage shock-absorber struts may be checked by measuring the strut extensions and checking these measurements against the graph in fig.5. The initial inflation pressure, with the strut fully extended, should be 545 ± 25 lbf. in. ▶

17. The nose undercarriage is liquid sprung and is not inflated with air, consequently graphs are not provided for checking its condition. The shock absorber must be charged to 1500 ± 0 lb/in$^2$ with hydraulic fluid as specified in Leading Particulars and with the nose wheel clear of the ground for optimum efficiency. After charging and when the shock absorber has settled down, the extension (dimension X in fig.1) should be noted for the most common CG configuration and all-up weight. The serviceability of the unit may be subsequently checked by using this dimension as a norm. Any abnormal variance is to be investigated by jacking up the nose and checking

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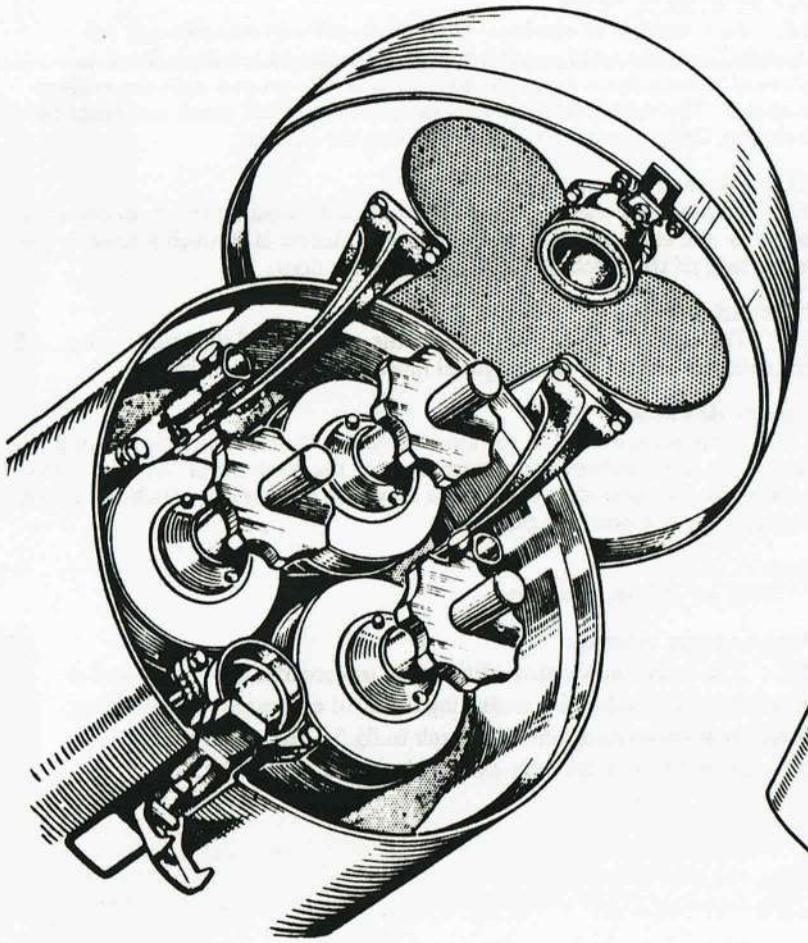
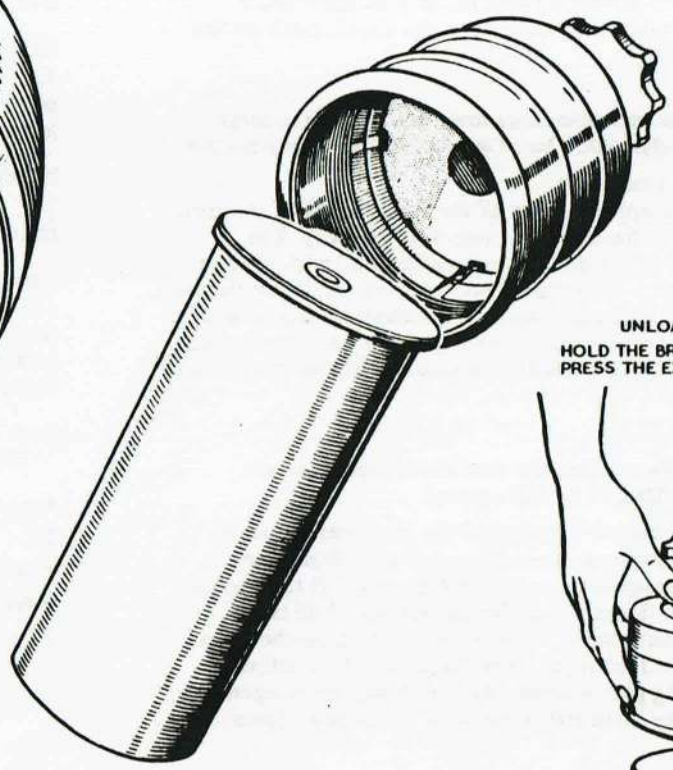


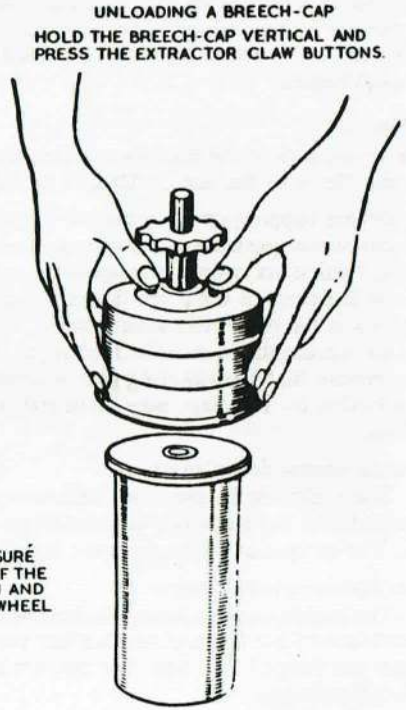
REMOVING A BREECH-CAP

RELEASE THE TOGGLE FASTENER AND RAISE THE DOME HEAD OF THE STARTER FAIRING. PRESS THE CENTRAL BUTTON OF THE BREECH-CAP TO BE REMOVED AND UNSCREW THE BREECH-CAP BY THE STARWHEEL UNTIL THE RATCHET DISENGAGES. RELEASE THE BUTTON AND CONTINUE TO UNSCREW UNTIL FREE.



LOADING A BREECH

PUSH THE CARTRIDGE INTO THE BREECH-CAP AND ENSURE THAT THE EXTRACTOR CLAWS ENGAGE OVER THE RIM OF THE CARTRIDGE. INSERT THE CARTRIDGE INTO THE BREECH AND SCREW THE BREECH-CAP INTO PLACE WITH THE STARWHEEL UNTIL FINGER TIGHT.
NOTE -DO NOT OVERTIGHTEN THE BREECH-CAP.



UNLOADING A BREECH-CAP

HOLD THE BREECH-CAP VERTICAL AND PRESS THE EXTRACTOR CLAW BUTTONS.

FIG. 4. TURBO-STARTER RELOADING

the pressure *(Sect.3, Chap.5B)*.

**Note . . .**

*The dimension X will vary from aircraft to aircraft and according to type of shock absorber fitted.*

**Tyre pressures**

**18.** The tyre pressures for both the main and nose undercarriages are given in A.P.101B-0400-5A3.

◀ To obviate the risk of auto-ignition dry nitrogen should be used to inflate the undercarriage wheel tyres. The occasional 'topping up' of pressure may be accomplished using dry air if nitrogen is not available. In an emergency dry air may be used to inflate the tyres but this must be rectified at the earliest opportunity. ▶

**Positioning the aircraft for ground running**

**19.** The aircraft must be headed into wind for all ground running, to prevent the hot gases entering the air-intakes and causing overheating. Before starting an engine, ensure that the aircraft is well clear of buildings and other aircraft, these, if less than 100 yards behind the aircraft, are liable to be damaged by the stream of hot gases or by loose objects thrown up by the air stream from the jet pipe. The ground in the immediate vicinity of the front of the aircraft must be kept clear of loose objects which may otherwise be drawn into the engine. All personnel should keep well clear of the air-intakes, at least five yards, and safety guards *(Chap.4, Table 1)* must be fitted to the air-intakes.

The aircraft must never be positioned on tarmac for ground running; if possible, position it on concrete, but if a concrete base is not available it may be positioned on grass.

**Reloading the engine starter**

**20.** The engines are started by triple-breech turbo-starters positioned in the air-intakes of both engines; the procedure for reloading the starter is given in fig.4.

**WARNING**

**The starter is to be reloaded only when the engine is stationary.**

**Cartridge failure**

**21.** If any cartridge fails to fire allow one minute to elapse before making another attempt to start. If the second and third cartridges fail to fire, wait one minute and check the electrical circuit.

**WARNING**

**A period of ten minutes must elapse between the third attempt and reloading the starter.**

**Engine-starting button**

**22.** Should the engine-starting button fail to remain depressed immediately the operator releases his pressure, an interval of at last one minute must elapse before making another attempt in case a start has been initiated. If the button fails to remain depressed on the second attempt, the aircraft must be considered unserviceable and the case investigated.

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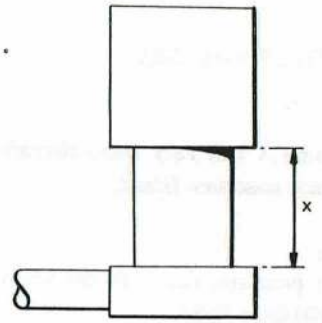


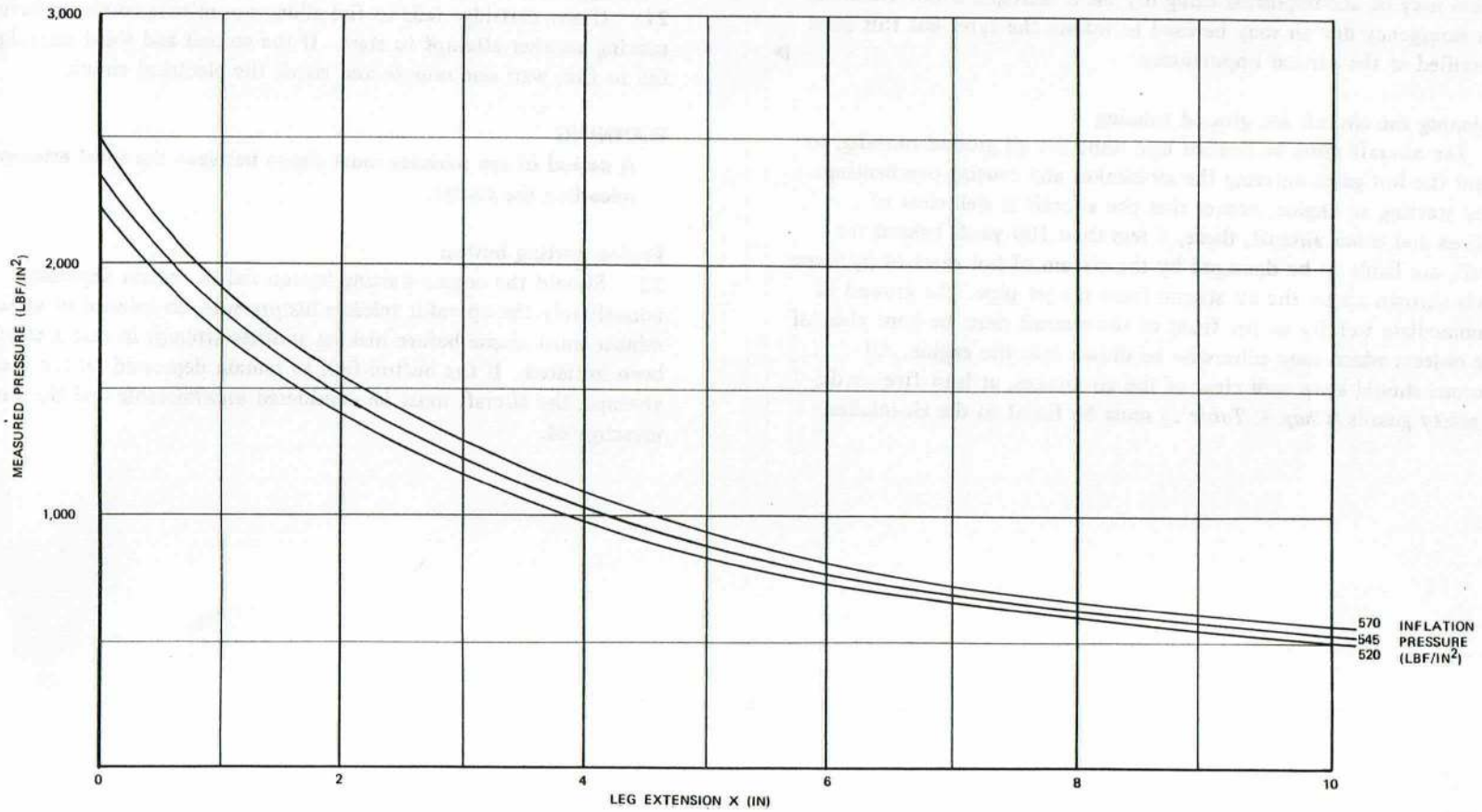


**FIG. 5. MAIN UNDERCARRIAGE INFLATION CHART**

# Chapter 3 LOADING AND C.G. DATA

◀ (Post Mods.5099, 5430, 5500) ▶

## LIST OF CONTENTS



## LIST OF TABLES



## LIST OF ILLUSTRATIONS

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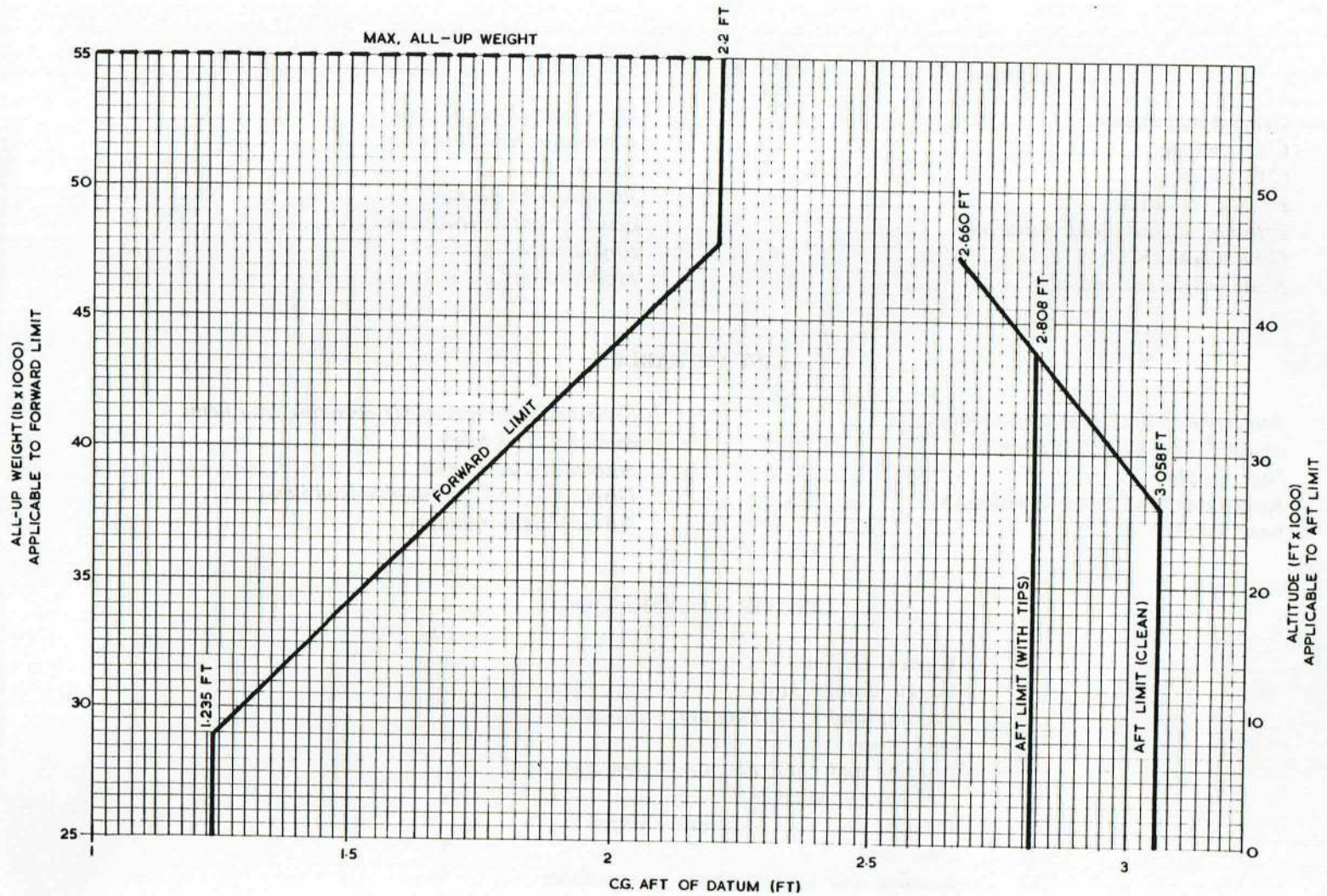


FIG. I. FLIGHT C.G. LIMITS

**General information**

**1.** This chapter deals with the effects of different and varying loads upon the C.G. position.

**C.G. position**

**2.** The aircraft C.G. position is determined with the fuselage datum horizontal (i.e. in the rigging attitude) and with the undercarriage down. All moment arms are measured in feet units parallel to the fuselage datum and are positive when they refer to items aft of the C.G. datum and negative when they refer to items forward of this datum.

**C.G. datum**

**3.** The C.G. datum is 4.695 ft forward of the spar datum and 0.455 ft below the fuselage horizontal datum. It is indicated by a screw marked C.G. datum on the port side of the fuselage. This screw can be used to suspend a plumb line during weighing operations.

**Flight C.G. limits** *(fig.1)*

**4.** Fig.1 prescribes the approved handling limits for C.G. movement measured from the C.G. datum.

*Forward limit*

This is dependent upon the weight of the aircraft. At weights below 29,000 lb the permissible forward limit is 1.235 ft aft. At weights in excess of 48,000 lb the permissible forward limit is 2.200 ft aft.

*Aft limit*

This is dependent upon the altitude of the aircraft.

*Aircraft without wing-tip tanks:-*

Up to 25,000 ft the aft C.G. limit is 3.058 ft aft of datum, it then moves linearly forward to 2.660 ft aft of datum at 45,000 ft.

*Aircraft with wing-tip tanks:-*

Up to 37,000 ft the aft C.G. limit is 2.808 ft aft of datum, it then moves linearly forward to 2.660 ft aft of datum at 45,000 ft.

Note . . .

*If the aircraft is to be taxied over rough ground the aft limit must not exceed 2.885 ft aft.*

**Effect of alighting gear retraction**

**5.** Retraction of the alighting gear introduces a moment of −1394 lb ft which must be taken into account when making calculations which assume that the alighting gear is retracted.

**Crew movement**

**6.** Movement of the navigator from his ejection seat to the occasional seat introduces a moment of −680 lb ft. Further forward movement to the prone position introduces an additional moment of −894 lb ft (a total moment change of −1574 lb ft).

**Basic weight and moment**

◀**7.** Table 6 refers to a basic weight of 24994 lb and a basic moment of +70290 lb ft. These figures are based on the weight of ▶ the aircraft Serial No. WT.509 at the modification standard detailed in para.14. A definition of the term 'basic weight' may be found in A.P.119W-0001-1. The basic weight and moment will vary between aircraft depending on their modification standard, and the figures quoted on the F751 should be substituted.

**Maximum all-up weights** *(fig.1)*

**8.** The aircraft is cleared for operational flying at the following maximum weights:

| | |
|---|---|
| Take off | 55,000 lb |
| Landing | 40,000 lb |

Note . . .

*Emergency landings only are permissible at weights in excess of this figure.*

**Alternative load items**

**9.** If stores other than those given are to be carried, their disposition should be similar to that of stores given in the all-up weight summary of approximately the same weight. This will ensure that the aircraft C.G. will at all times remain within the C.G. handling limits, providing that normal fuel drill and the correct sequence for dropping stores are adhered to.

**Ballast**

**10.** Ballast weights totalling 266 lb *(Sect.3, Chap.1)* are provided to help maintain the C.G. position within the C.G. range. Adjustment may be made necessary due to removal or non-fitment of equipment, introduction of modifications etc. In order to ensure that the C.G. for individual aircraft will remain within the handling limits at all times, when carrying and releasing any of the permissible loads, the C.G. of the aircraft at the basic weight plus ballast i.e. without fuel, crew and alternative load equipment must always be maintained at + 2.79 (±0.04) ft

Note . . .

*Ballast is not required in this aircraft to enable it to meet any of the commitments currently envisaged. Reference to its fitment is retained however to cover the possibility of it becoming necessary as a result of future modifications.*

**Weighing the aircraft**

**11.**

*Preparation*

Note . . .

*Because of the difficulty in draining No.6 tank and the collector box completely, the aircraft should be weighed with No.1, 2, 3, 4, 5 and wing integral tanks empty but with No.6 tank and collector box full.*

(1) With the aircraft in the rigging position carefully drain the fuselage and wing fuel tanks, using the procedure described in Sect.4, Chap.2 but ignoring the instructions given in para.7, for complete drainage of the belly tank and collector box. When draining of top, rear and wing tanks is complete and the drain valves have been closed, fill No.6 tank and collector box to maximum capacity and replace the filler cap.

(2) Remove all other expendable load items and all possible alternative load items from the aircraft.

*Non-hydrostatic method of weighing*

(3) Information of general nature concerning the practical measurement of basic weight and moment is contained in A.P.119W-0001-1.

*Hydrostatic method*

(4) The equipment required for weighing the aircraft, using the hydrostatic method, is listed in Sect.2, Chap.4, Table 2. A.P.119W-0301-1 gives general information on hydrostatic units and their use; the following instructions amplify this:-

(a) Jack the aircraft at the main and front fuselage jacking points *(Sect.2, Chap.4).*

(b) Place locally-manufactured wood blocks of sufficient thickness to provide the necessary clearance for the hydrostatic unit and jacks, under the nose and main wheels. Lower the aircraft on to the blocks and remove the lifting jacks.

(c) Assemble:-

(i) A 25-ton hydrostatic unit, a 15-ton jack and jack-to-unit and unit-to-aircraft pad adapters at each main wheel jacking point.

(ii) A 10-ton hydrostatic unit, an 8-ton jack and jack-to-unit and unit-to-nose undercarriage adapters, under the nose undercarriage axle between the twin wheels.

(d) Weigh the aircraft as instructed in A.P.119W-0301-1.

(e) Lower the aircraft on to the wood blocks and remove the weighing equipment.

(f) Jack the aircraft *(operation (a))* and remove the blocks.

(g) Lower the aircraft to the ground and remove the jacks.

**Basic weight determination**

**12.** To the weight and moment obtained from weighing, add:

(1) The weight and moment of drainable unusable fuel in the pipelines *(Note 2 of Table 1).*

(2) The weight and moment of Table 2 items not fitted at weighing but required for flight.

Deduct the weight and moment of all items from Tables 3, 4, 5 and 6 which were fitted at weighing.

The resultant figures are the basic weight and moment.

Note . . .

*The total amount of adjustable ballast fitted at the time of weighing must be deducted.*

**Engine data**

**13.** In the event of an engine change, Mod.F751 must be amended to account for any changes in the engine weight and moment in accordance with the values quoted for the individual engine on the engine log card. The C.G. position as quoted on the log card will be to an engine datum either the front or rear suspension point which can be corrected to the A/C datum using the data given in fig.2.

**Modifications**

**14.** The basic weight given in Table 6 includes the modifications quoted in CAN/7/Y/2 plus the modifications listed in sub-para.(1). Minus those listed in sub-para.(2).

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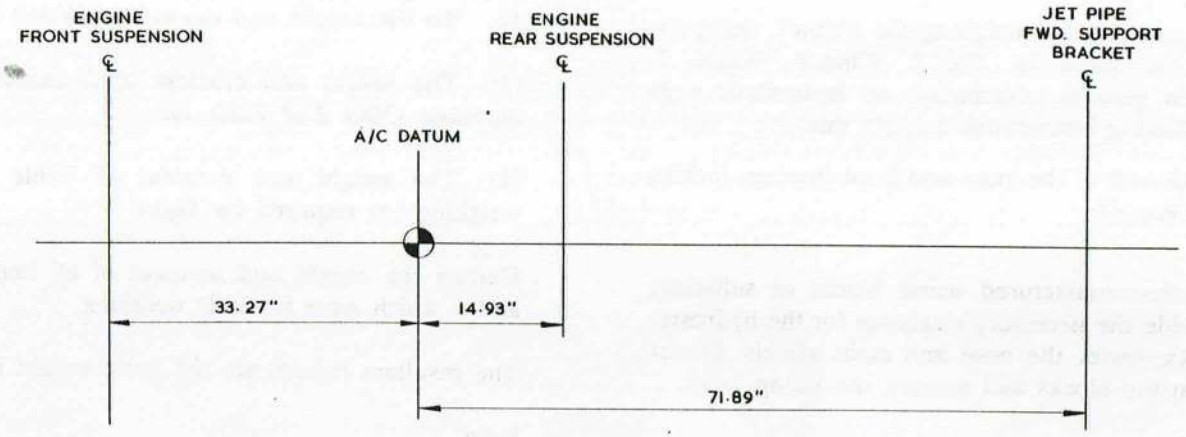


Fig.2. Engine change data

(1) 282 517 545 704 738 865 875 885 1040 1046 1050 1155 1159 1198 1256 1257 1259 1268 1276 1281 1282 1299 1405 1412 1426 1452 1453 1456 1460 1463 1485 1496 1497 1499 1701 1712 1713 1722 1724 1726 1732 1737 1740 1771 1904 1918 1921 1944 1945 1958 1982 1985 1990 1995 1998 1999 2126 2147 2150 2161 2172 2235 2323 2357 2359 2371 2389 2400 2502 2544 2545 2591 2605 2615 2634 2642 2689 2718 3093 3158 3182 3185 3187 3193 3221 3244 3278 3383 3391 3461 3482 3545 3562 3585 3595 3759 3843 3849 3884 3900 3910 3945 3971 4003 4009 4011 4040 4097 4112 4233 4288 4350 4356 4451 4793 4924 4930 5209 5228 304Pt. 736Pt. 1295Pt. 1491Pt. 2308Pt. 3391Pt. 3822Pt. ◀5022Pt. 5182Pt. 5196Pt. 5099Pt. 5430. 5500.▶

(2) 1404 1731 3274 3730 3936 4103 5190.

## TABLE 1

### Summary of drainable and undrainable unusable fuel to be included in basic weight

| Location | Weight (lb) | Arm (ft) | Moment (lb ft) |
|---|---|---|---|
| Fuel, pipes in wings | 30.00 | +4.035 | +121.00 |
| Fuel, pipes in fuselage | 13.00 | +5.433 | + 70.63 |
| Fuel, recuperators | 64.00 | +1.323 | + 84.67 |
| No.6 tank and collector box (30 gal unusable and undrainable) | 240.00 | −1.101 | −264.00 |
| TOTAL TRAPPED (undrainable) FUEL | 347.00 | | + 12.30 |

Note . . .

*(1) Due to the disposition of certain fuel pipes and the fact that the wing tanks are normally drained with the L.P. cocks closed, the above weight of fuel will remain trapped when the fuel tanks are drained.*

*(2) Since all fuel in pipelines and unusable fuel in tanks is included in the basic weight, the following fuel weights must be added when determining the basic weight after weighing the aircraft.*

| | | | |
|---|---|---|---|
| Drainable fuel in pipelines | 16.00 | +2.977 | +47.63 |
| Drainable but unusable fuel in integral tanks | 32.00 | +2.183 | +69.86 |

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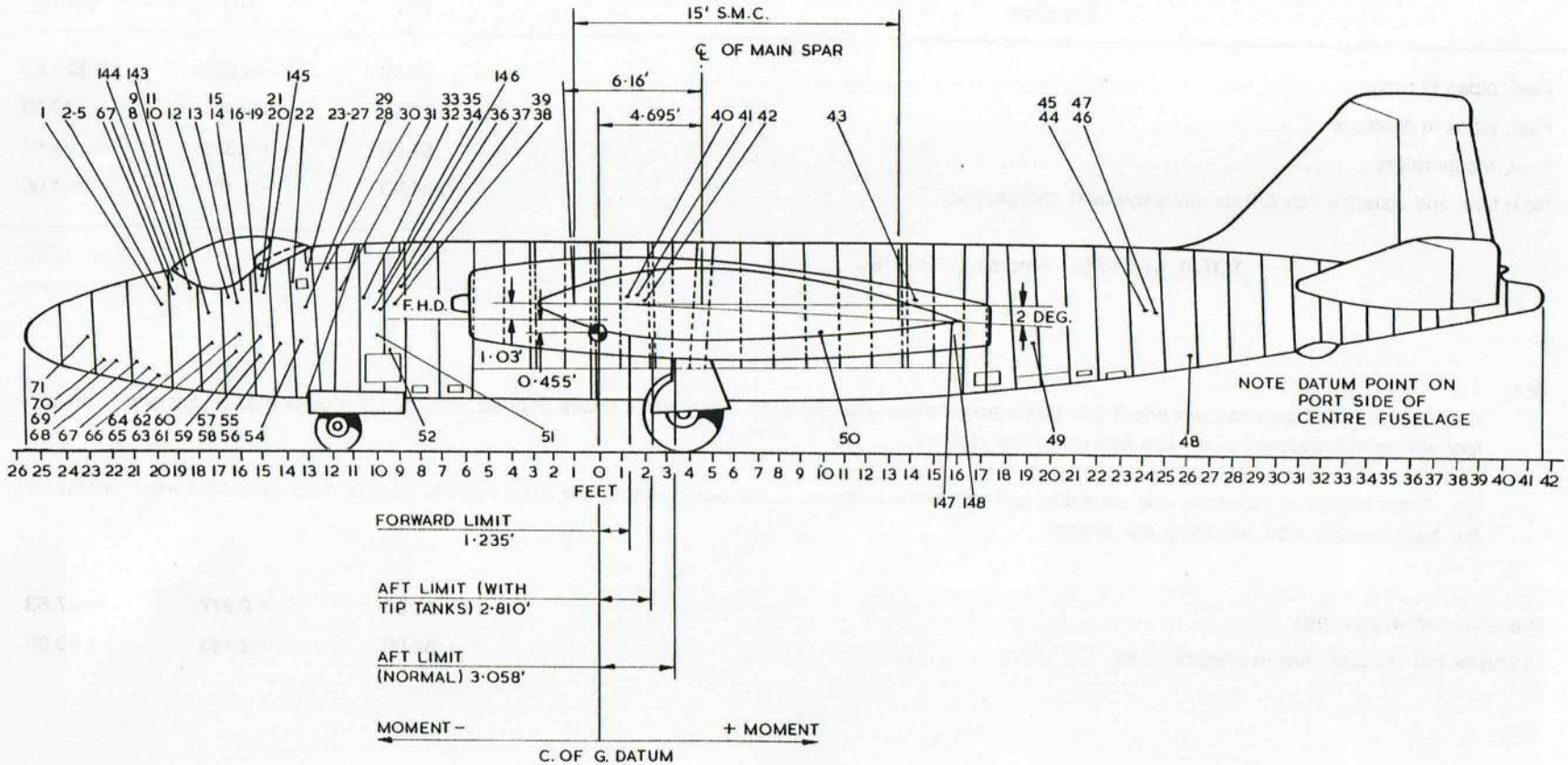


FIG. 3. LOADING AND C.G. DIAGRAM - REMOVABLE LOAD ITEMS

## TABLE 2

### Removable load items included in basic weight (fig.3)

| Fig.3 Item No. | Ref. or Part No. | Qty. | Description | Weight (lb) | Arm (ft) | Moment (lb ft) |
|---|---|---|---|---|---|---|
| | | | MISCELLANEOUS ITEMS | | | |
| 65 | 12G/1279 | 1 | Detonator, electric, No.109, Mk.1 (controls) | 0.02 | −17.38 | − 0.35 |
| 12 | 12G/1278 | 32 | Detonator, electric, No.108, Mk.1 (canopy) | 0.74 | −16.87 | − 12.48 |
| 30 | 12G/1278 | 34 | Detonator, electric, No.108, Mk.1 (hatch) | 0.78 | −12.10 | − 9.44 |
| 13 | 12K/9629465 | 1 set | Cartridges, ejection seat, No.1, Mk.1 (pilot) | 1.58 | −16.02 | − 25.31 |
| 31 | 12K/9629465 | 1 set | Cartridges, ejection seat, No.1, Mk.1 (navigator) | 1.58 | −11.52 | − 18.20 |
| 49 | 12K/9621036 | 6 | Cartridges, engine starting, No.10, Mk.3 | 18.00 | +19.14 | +344.52 |
| 70 | 6D/1644 | 1 | Oxygen emergency set, Mk.2A | 2.00 | −22.60 | − 45.20 |
| 38 | 6D/9429896 | 6 | Cylinders, oxygen, 750 litre, charge | 14.06 | − 9.32 | −131.04 |
| 39 | 6D/9429900 | 1 | Cylinder, oxygen, 2250 litre, charge | 7.03 | − 9.42 | − 66.22 |
| 1 | 6A/2197 | 1 | Clock, fluorescent, Mk.4 | 0.44 | −19.73 | − 8.68 |
| 59 | 22G/108081 | 1 pair | Gauntlets, fire fighting, fire resistant | 0.88 | −15.28 | − 13.45 |
| 63 | 6545-99-211-0640 | 1 | First-aid outfit | 3.00 | −15.75 | − 47.25 |
| 51 | 12L/203 | 1 | Destructor, aircraft, No.1, Mk.1 | 3.25 | − 9.62 | − 31.27 |
| 64 | 12G/9635203 | 1 | Charge, emergency control severing, No.1, Mk.3 | 0.37 | −17.38 | − 6.43 |
| 23 | 6B/2764 | 1 | Periscope, rear viewing | 4.53 | −13.12 | − 59.43 |
| 24 | 6B/3469 | 1 | Mounting, periscope, Mk.1F | 5.75 | −13.12 | − 75.44 |
| ◀ 68 | NOT USED | | | | | |
| 52 | 5J/3364 | 1 | Battery, secondary, alkaline, 24 volt, Saft, Type 20.VO.35 | 76.97 | − 9.35 | −719.67 |
| 66 | 5J/9101543 | 2 | Battery, secondary, lead acid, 12 volt, 4 amp hours | 9.88 | −19.24 | −190.09 |
| 41 | 6B/4343636 | 1 | Air mileage unit, Mk.4A | 10.50 | + 1.49 | + 15.65 |
| 28 | 6B/4343641 | 1 | Amplifier unit, Type B | 10.00 | −13.17 | −131.70 |
| 2 | 6B/4343640 | 1 | Gyro unit, Type B | 6.00 | −19.87 | −119.22 |
| 16 | 6B/4352094 | 1 | Indicator, master, Type E5 — GM4B compass | 7.06 | −15.57 | −109.92 |
| 17 | 6B/408 | 1 | Panel, control, Type A | 1.28 | −15.07 | − 19.29 |
| 54 | 6B/4343797 | 1 | Sextant, periscope, Mk.2, c/w carrying case | 11.56 | −13.97 | −161.49 |
| 69 | 6A/3122 | 1 | Zero reader flight computer, Type A | 19.63 | −21.72 | −426.36 |
| 3 | 6A/5798 | 1 | Horizon gyro, Mk.4A | 6.56 | −19.86 | −130.28 |
| 4 | 6A/3119 | 1 | Indicator, cross pointer — Zero reader | 1.50 | −19.62 | − 29.43 |
| 6 | 6A/3120 | 1 | Combined control/course selector | 2.88 | −19.54 | − 56.28 |

*continued . . .*

**TABLE 2 Removable load items included in basic weight (fig.3)** — *continued*

| Fig.3 Item No. | Ref. or Part No. | Qty. | Description | Weight (lb) | Arm (ft) | Moment (lb ft) |
|---|---|---|---|---|---|---|
| 58 | 27N/1 | 1 | Axe, fire | 2.42 | −15.05 | − 36.42 |
| 11 | 27KD/375 | 5 | Stoppers, leak, cabin pressure | 1.25 | −17.50 | − 21.88 |
| 36 | 5J/1115903 | 1 | Battery, 19 V07 LK | 18.00 | − 9.52 | − 171.36 |
| 67 | EA3.83.97 | 1 | Ballast crate, non-adjustable | 21.06 | −19.99 | − 420.99 |
| 43 | 27N/100 | 1 | Extinguisher, fire, Methyl Bromide, automatic, Type 12A | 10.63 | +13.83 | + 147.01 |
| 42 | 27N/100 | 2 | Extinguishers, fire, Methyl Bromide, automatic, Type 12A (wing) | 21.25 | + 2.00 | + 42.50 |
| 40 | 27N/102 | 2 | Extinguishers, fire, Methyl Bromide, automatic, Type 14A (wing) | 38.62 | + 1.01 | + 39.01 |
| 55 | 27N/299 | 1 | Extinguisher, fire, hand-operated, Type 34H | 5.19 | −14.68 | − 76.19 |
| 57 | 27H/3224 | 1 | Container, urine, Mk.2 and funnel | 1.09 | −15.18 | − 16.55 |
| 61 | EA3.80.1989 | 1 | Handle for emergency hydraulic hand-pump (stowed) | 0.85 | −16.14 | − 13.72 |
| | | | U/VHF ARI 23143/1 | | | |
| 48 | 5821-99-971-1781 | 1 | Transmitter-receiver, PTR 175 | 50.00 | +26.66 | +1333.00 |
| 8 | 5821-99-945-5739 | 1 | Control unit, Type C 1607/4 | 3.40 | −18.50 | − 62.90 |
| 20 | 5821-99-107-0030 | 1 | Control unit, Type C 1607/7 | 2.40 | −15.50 | − 37.20 |
| | | | STANDBY UHF ARI 23159/1 | | | |
| 37 | 5821-99-952-8931 | 1 | Transmitter-receiver, D403M | 5.60 | − 9.25 | − 51.80 |
| | | | ILS ARI 18011 | | | |
| 26 | 10L/263 | 1 | Control unit, Type 705 | 1.75 | −13.11 | − 22.94 |
| 34 | 10D/17818 | 1 | Receiver, localizer marker, R1964 | 18.00 | − 9.23 | − 166.14 |
| 35 | 10D/17819 | 1 | Receiver, glide path, R1965 | 16.80 | − 9.85 | − 165.48 |
| | | | RADIO COMPASS ARI 23023/1 | | | |
| 32 | 10D/19598 | 1 | Receiver, AD 7092D | 15.00 | −10.21 | − 153.15 |
| 33 | 10D/17031 | 1 | Mounting tray, Type 182 | 1.25 | −10.21 | − 12.76 |
| 22 | 10L/16073 | 1 | Receiver control unit, Type 1274 | 2.80 | −13.25 | − 37.10 |

*continued . . .*

**TABLE 2 Removable load items included in basic weight (fig.3)** — *continued*

| Fig.3 Item No. | Ref. or Part No. | Qty. | Description | Weight (lb) | Arm (ft) | Moment (lb ft) |
|---|---|---|---|---|---|---|
| | | | HF COMMUNICATION ARI 23090/9 | | | |
| 53 | 110D/6043307 | 1 | Transmitter-receiver, 618T-3 | 52.00 | −12.79 | −665.08 |
| 9 | 110L/0198405 | 1 | Control unit, Type 714E-3 | 3.00 | −18.17 | − 54.51 |
| | | | DECCA V.O.R. ARI 23247/3 | | | |
| 62 | 10D/6267139 | 1 | V.O.R. receiver, RV671 | 6.50 | −16.00 | −104.00 |
| 14 | 5826-99-631-8215 | 1 | Control unit, Type BN671-4 | 1.00 | −15.50 | − 15.50 |
| 15 | 6B/6831 | 1 | Master indicator, Type E5 | 8.00 | −15.50 | −124.00 |
| | | | INTERCOMM. ARI 18099 | | | |
| 10 | 10L/16320 | 1 | Control unit, Type 7681 | 3.00 | −17.32 | − 51.96 |
| 27 | 10L/16320 | 1 | Control unit, Type 7681 | 3.00 | −14.05 | − 42.15 |
| 25 | 10U/16596 | 1 | Amplifier, Type A1961 | 6.80 | −13.86 | − 94.25 |
| | | | D.M.E. ARI 23238/5 | | | |
| 60 | 5826-00-062-0766 | 1 | Transmitter-receiver, M1-591083-1 | 15.50 | −16.00 | −248.00 |
| 18 | 5826-99-630-6127 | 1 | Control unit, Type BD671-MB | 1.00 | −15.50 | − 15.50 |
| 5 | 5826-99-630-6137 | 1 | Range and bearing indicator, 1D-663U/A | 2.50 | −19.10 | − 47.75 |
| 19 | 5826-99-117-8698 | 1 | Distance/ground speed indicator, M1-591085-8 | 0.50 | −15.50 | − 7.75 |
| | | | DECCA DOPPLER 72 ARI 5972/2 AND GPI Mk.4A | | | |
| 50 | 5841-99-112-4924 | 1 | Transmitter-receiver and aerial assy | 36.75 | + 9.50 | +344.00 |
| 56 | 5841-99-618-1785 | 1 | Control indicator | 19.00 | −14.00 | −266.00 |
| 71 | 5841-99-1078 | 1 | Drift angle and ground speed indicator | 3.00 | −23.00 | − 69.00 |
| 29 | 6B/2649 | 1 | Ground position indicator Mk.4A | 25.00 | −13.00 | −325.00 |
| | | | IFF/SSR 1520 ARI 23134/1 | | | |
| 44 | 5895-99-956-3378 | 1 | Transponder, 16928 | 30.00 | +24.27 | +728.10 |
| 45 | 5820-99-107-5637 | 1 | Mounting, Type 16946 | 1.25 | +24.27 | + 30.34 |
| 21 | 5895-99-956-3379 | 1 | Control unit, Type 16929 | 2.00 | −16.05 | − 32.10 |

*continued . . .*

**TABLE 2 Removable load items included in basic weight (fig.3)** — *continued*

| Fig.3 Item No. | Ref. or Part No. | Qty. | Description | Weight (lb) | Arm (ft) | Moment (lb ft) |
|---|---|---|---|---|---|---|
| | | | RADAR ALTIMETER ARI 23219/4 | | | |
| 46 | 5841-00-0580338 | 1 | Transmitter-receiver, HG9050-D1 | 13.41 | +24.65 | +330.56 |
| 47 | 5841-00-0639358 | 1 | Mounting tray, Type 1987638-1 | 2.25 | +24.65 | + 55.46 |
| 7 | 110Q/9331802 | 1 | Indicator, Type JG206-D1 | 1.59 | −19.10 | − 30.37 |
| | | | TACAN (SR1M 4012) | | | |
| 143 | 10L/16310 | 1 | Tacan Control Unit 7750 | 1.19 | −18.50 | −22.02 |
| 144 | 10Q/16335 | 1 | Indicator Tacan Type 9547 | 1.52 | −19.50 | −29.60 |
| 145 | 10Q/16335 | 1 | Indicator Tacan Type 9547 | 1.52 | −15.00 | −22.80 |
| 146 | | 1 | Inverter Type 208 | 35.80 | − 9.20 | −329.36 |
| 147 | 10D/6914896 | 1 | Tacan T/R RT220c/HRN 21 | 50.00 | +15.27 | +763.50 |
| 148 | 10D/22534 | 1 | Tacan Coupling Unit Type 9546 | 7.13 | +15.60 | +111.23 |

## TABLE 3

### Crew and crew removable operating load items common to all roles (fig.4)

| Fig.4 Item No. | Ref. or Part No. | Qty. | Description | Weight (lb) | Arm (ft) | Moment (lb ft) |
|---|---|---|---|---|---|---|
| | | | PILOT AND EQUIPMENT | | | |
| 78 | – | 1 | Pilot | 180.00 | −17.56 | −3160.80 |
| 79 | 22C/2274 | 1 | Jacket, life-saving, Mk.7 | 6.50 | −17.00 | − 110.50 |
| 75 | 22C/1482391 | 1 | Pack, personal, survival, Type M, Mk.2B | 25.00 | −17.51 | − 437.75 |
| 74 | 15A/4177654 | 1 | Parachute, seat-type, Mk.18 | 26.00 | −17.58 | − 457.08 |
| 72 | – | 1 | Pilot's notes | 0.20 | −19.33 | − 3.87 |
| 77 | 5A/3391 | 1 | Torch, electric, Type O, c/w cells | 0.72 | −19.33 | − 13.92 |
| 73 | 6F/171 | 1 | Pad, writing, knee-type | 1.38 | −18.40 | − 25.39 |
| 76 | 6D/2678 | 1 | Oxygen emergency, set Mk.7J | 3.25 | −17.58 | − 57.14 |
| | | | NAVIGATOR AND EQUIPMENT | | | |
| 80 | – | 1 | Navigator | 180.00 | −13.06 | −2350.80 |
| 82 | 22C/2274 | 1 | Jacket, life-saving, Mk.7 | 6.50 | −12.65 | − 82.23 |
| 83 | 22C/1482391 | 1 | Pack, personal, survival, Type M, Mk.2B | 25.00 | −13.05 | − 326.25 |
| 81 | 15A/4177654 | 1 | Parachute, seat-type, Mk.18 | 26.00 | −13.10 | − 340.60 |
| 84 | 6D/2678 | 1 | Oxygen emergency, set Mk.7J | 3.25 | −13.10 | − 42.58 |
| 85 | 6B/469 | 1 | Case, carrying, navigation equipment, containing: | 1.00 | −13.69 | − 13.69 |
| 85 | 5A/3391 | 1 | Torch, electric, Type O, c/w cells | 0.72 | −13.69 | − 9.86 |
| 85 | 6B/539 | 1 | Watch, stop | 0.25 | −13.69 | − 3.42 |
| 85 | 6E/392 | 1 | Binoculars, 40 mm, Mk.5 | 2.13 | −13.69 | − 29.16 |
| 85 | 6E/320 | 1 | Binoculars, 50 mm, 7 in. dia. | 2.00 | −13.69 | − 27.38 |
| 85 | 6B/490 | 1 | Computer, dead reckoning, Mk.4 | 0.75 | −13.69 | − 10.27 |
| 85 | 6B/47 | 1 | Protractor, Douglas, 5 in. | 0.14 | −13.69 | − 1.92 |
| 85 | 6B/260 | 1 | Rules, navigation, Mk.1 | 0.13 | −13.69 | − 1.78 |
| 85 | 13/94 | 2 | Sets, compass | 0.25 | −13.69 | − 3.42 |
| 85 | 6B/349 | 1 | Straight edge, 20 in. | 0.30 | −13.69 | − 4.11 |
| | | | TOTAL CREW AND CREW REMOVABLE LOAD ITEMS | 491.47 | −15.29 | −7513.92 |

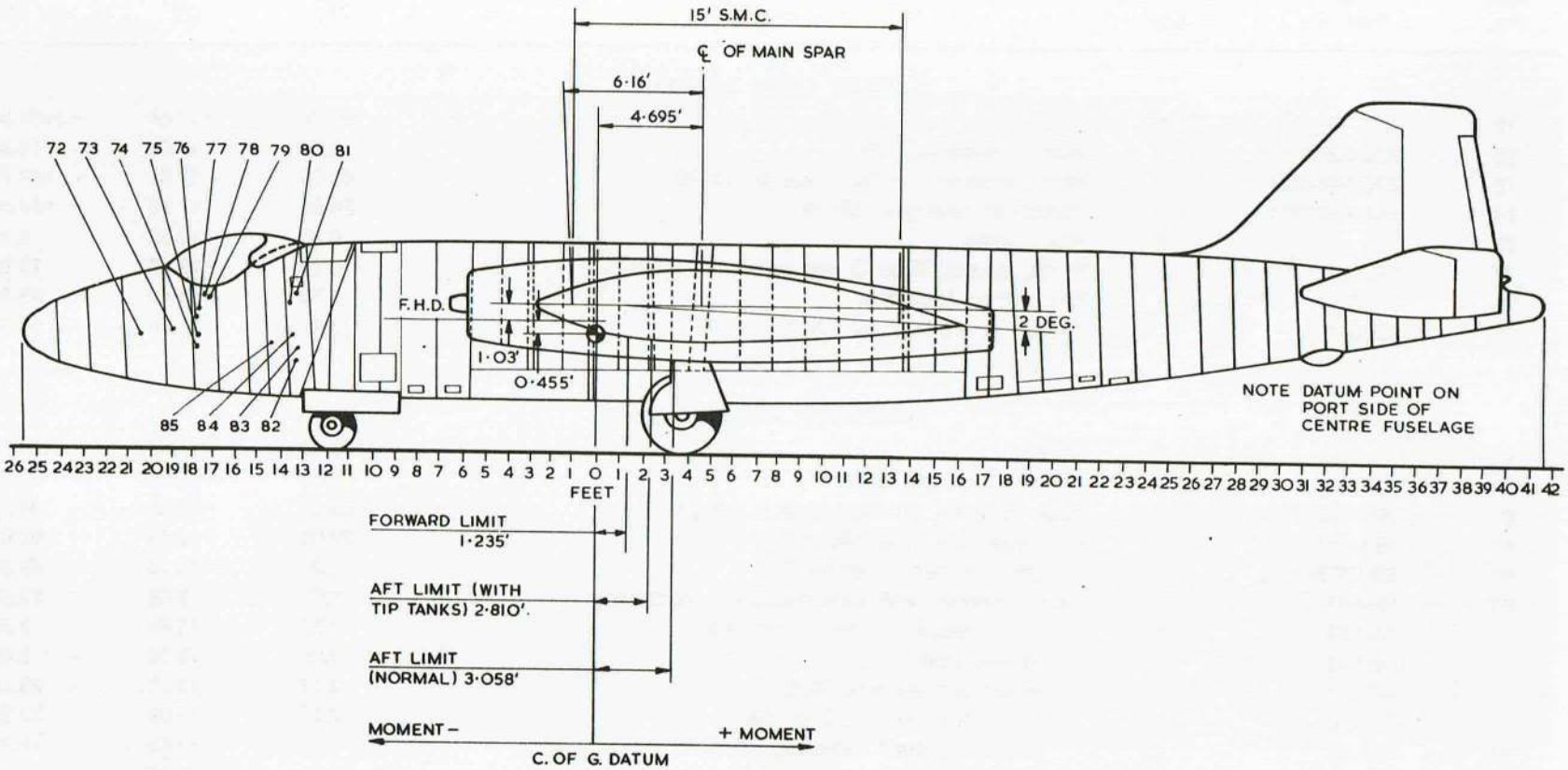


FIG. 4. LOADING AND C.G. DIAGRAM - CREW AND CREW REMOVABLE LOAD ITEMS

## TABLE 4

### Alternative load items (fig.5)

| Fig.5 Item No. | Bay | Ref. or Part No. | Description | Qty | Arm (ft) | Fit 1 (Standard Camera Fit) Weight (lb) | Fit 1 (Standard Camera Fit) Moment (lb ft) | Fit 2 (Survey and Task Fit) Weight (lb) | Fit 2 (Survey and Task Fit) Moment (lb ft) |
|---|---|---|---|---|---|---|---|---|---|
| 116 | 38 | 14A/4133 | Camera, F49 (6″ lens) | 1 | +22.96 | 65.00 | +1492.40 | 65.00 | +1492.40 |
| 115 | 38 | 14A/3573 | Mounting, F49 | 1 | +22.96 | 5.19 | + 119.16 | 5.19 | + 119.16 |
| *111 | 33 | 14A/2802 | Camera, F52 (36″ lens) | 2 | +16.81 | 168.50 | +2832.49 | 168.50 | +2832.49 |
| 114 | 33 | 14A/988 | Motor, Type B | 2 | +16.81 | 7.39 | + 124.39 | 7.39 | + 124.23 |
| 112 | 33 | 14A/3568 | Drive, Type C | 2 | +16.81 | 1.56 | + 26.22 | 1.56 | + 26.22 |
| 104 | 33 | 14A/4130 | Adapter, No.5 | 2 | +16.81 | 13.00 | + 218.56 | 13.00 | + 218.56 |
| 118 | 33 | 14A/4128 | Mounting, F52 | 2 | +16.81 | 23.00 | + 386.63 | 23.00 | + 386.63 |
| 101 | 16 | 14A/5556 | Camera, F95 (4″ lens) | 1 | − 6.15 | 16.00 | − 98.40 | | |
| 102 | 16 | 14A/5556 | Camera, F95 (12″ lens) | 1 | − 6.15 | 21.50 | − 132.23 | | |
| 123 | 16 | EB7.83.5221/5219 | Support | 2 | − 6.15 | 13.90 | − 85.49 | | |
| 93 | 15 | 14A/2802 | Camera, F52 (48″ lens) oblique | 1 | − 7.80 | Not fitted | | | |
| 98 | 15 | 14A/988 | Motor, Type B | 1 | − 7.80 | Not fitted | | | |
| 96 | 15 | 14A/3568 | Drive, Type C | 1 | − 7.80 | Not fitted | | | |
| 110 | 15 | 14A/4130 | Adapter, No.5 | 1 | − 7.80 | Not fitted | | | |
| 91 | 15 | 14A/4128 | Mounting, F52 | 1 | − 7.80 | Not fitted | | | |
| 86 | 1 | 14A/5556 | Camera, F95 (4″ lens) | 1 | −23.62 | 16.00 | − 377.92 | 16.00 | − 377.92 |
| 126 | 2 | EB7.83.5217 | Nose platform | 1 | −23.17 | 4.30 | − 99.63 | 4.30 | − 99.63 |
| 87 | 2 | | Drift and tilt control | 1 | −23.15 | 4.00 | − 92.60 | 4.00 | − 92.60 |
| 128 | 2 | | Photographic sight | 1 | −23.19 | 15.84 | − 367.33 | 15.84 | − 367.33 |
| 88 | 2 | 14A/4014 | Control units | 2 | −23.15 | 8.50 | − 196.78 | 8.50 | − 196.78 |
| 89 | 6 | | F95 Camera control unit | 1 | −17.31 | 3.28 | − 56.78 | 3.28 | − 56.78 |
| 103 | 16 | 14A/2802 | Camera, F52 (36″ lens) | 2 | − 6.15 | | | 168.50 | −1036.27 |
| 99 | 16 | 14A/988 | Motor, Type B | 2 | − 6.15 | | | 7.39 | − 45.45 |
| 100 | 16 | 14A/3568 | Drive, Type C | 2 | − 6.15 | | | 1.56 | − 9.59 |
| 94 | 16 | 14A/4130 | Adapter, No.5 | 2 | − 6.15 | | | 13.00 | − 79.95 |
| 105 | 16 | 14A/4128 | Mounting, F52 | 2 | − 6.15 | | | 23.00 | − 141.45 |
| 127 | 15 | 14A/2802 | Camera, F52 (36″ lens) | 2 | − 7.80 | | | 168.50 | −1314.30 |
| 97 | 15 | 14A/988 | Motor, Type B | 2 | − 7.80 | | | 7.39 | − 57.64 |
| 95 | 15 | 14A/3568 | Drive, Type C | 2 | − 7.80 | | | 1.56 | − 12.17 |

*continued . . .*

TABLE 4 Alternative load items (fig.5) — *continued*

| Fig.5 Item No. | Bay | Ref. or Part No. | Description | Qty. | Arm (ft) | Fit 1 (Standard Camera Fit) Weight (lb) | Fit 1 (Standard Camera Fit) Moment (lb ft) | Fit 2 (Survey and Task Fit) Weight (lb) | Fit 2 (Survey and Task Fit) Moment (lb ft) |
|---|---|---|---|---|---|---|---|---|---|
| 113 | 15 | 14A/4130 | Adapter, No.5 | 2 | - 7.80 | | | 13.00 | - 101.40 |
| 92 | 15 | 14A/4128 | Mounting, F52 | 2 | - 7.80 | | | 23.00 | - 179.40 |
| 107 | 33 | 14A/5556 | Camera, F95 (4" lens) | 1 | + 16.81 | | | | |
| 108 | 33 | 14A/5556 | Camera, F95 (12" lens) | 1 | + 16.81 | | | | |
| 109 | 33 | EB7.83.5221/5219 | Support | 2 | + 16.81 | | | | |
| 106 | 27 | EA2.97.5003 | Auxiliary flare beam | 1 | + 9.10 | | | | |
| 120 | 28 | | Mini photoflash crate | 1 | + 10.15 | | | | |
| 121 | 28 | 11A/4715 | Release unit No.3 | 1 | + 9.69 | | | | |
| 119 | 28 | | Photoflashes | 60 | + 10.15 | | | | |
| 122 | 16 | 14A/4592 | Camera, F97 | 2 | - 6.10 | | | | |
| 124 | 16 | 14A/4599 | Adapter | 1 | - 6.10 | | | | |
| 125 | 16 | EA2.83.5711 | Cable | 1 | - 6.10 | | | | |
| 90 | 10 | 14A/4276 | F97 Camera control unit | 1 | - 13.51 | | | | |
| 129 | 2 | | T3/T4 Bombsight | 1 | - 23.53 | | | | |
| 117 | 40 | 27C/2379 | Survival packs | 2 | + 26.49 | 88.00 | + 2331.12 | 88.00 | + 2331.12 |
| | | | | | | 474.96 | + 6023.81 | 850.46 | + 3362.15 |

* *NOTE: 20" lens may be fitted as alternative in Fit 2 Survey Role.*

*continued . . .*

**TABLE 4 Alternative load items (fig.5)** — *continued*

| Fig.5 Item No. | Bay | Ref. or Part No. | Description | Qty. | Arm (ft) | Fit 3 (Shipping Fit) Weight (lb) | Fit 3 (Shipping Fit) Moment (lb ft) | Fit 4 (Night Fit) Weight (lb) | Fit 4 (Night Fit) Moment (lb ft) |
|---|---|---|---|---|---|---|---|---|---|
| 116 | 38 | 14A/4133 | Camera, F49 (6″ lens) | 1 | +22.96 | 65.00 | +1492.40 | 65.00 | +1492.40 |
| 115 | 38 | 14A/3573 | Mounting, F49 | 1 | +22.96 | 5.19 | + 119.16 | 5.19 | + 119.16 |
| *111 | 33 | 14A/2802 | Camera, F52 (36″ lens) | 2 | +16.81 | | | 168.50 | +2832.49 |
| 114 | 33 | 14A/988 | Motor, Type B | 2 | +16.81 | | | 7.39 | + 124.23 |
| 112 | 33 | 14A/3568 | Drive, Type C | 2 | +16.81 | | | 1.56 | + 26.22 |
| 104 | 33 | 14A/4130 | Adapter, No.5 | 2 | +16.81 | | | 13.00 | + 218.56 |
| 118 | 33 | 14A/4128 | Mounting, F52 | 2 | +16.81 | | | 23.00 | + 386.63 |
| 101 | 16 | 14A/5556 | Camera, F95 (4″ lens) | 1 | − 6.15 | 16.00 | − 98.40 | | |
| 102 | 16 | 14A/5556 | Camera, F95 (12″ lens) | 1 | − 6.15 | 21.50 | − 132.23 | | |
| 123 | 16 | EB7.83.5221/5219 | Support | 2 | − 6.15 | 13.90 | − 85.49 | | |
| 93 | 15 | 14A/2802 | Camera, F52 (48″ lens) oblique | 1 | − 7.80 | Not fitted | | Not fitted | |
| 98 | 15 | 14A/988 | Motor, Type B | 1 | − 7.80 | Not fitted | | Not fitted | |
| 96 | 15 | 14A/3568 | Drive, Type C | 1 | − 7.80 | Not fitted | | Not fitted | |
| 110 | 15 | 14A/4130 | Adapter, No.5 | 1 | − 7.80 | Not fitted | | Not fitted | |
| 91 | 15 | 14A/4128 | Mounting, F52 | 1 | − 7.80 | Not fitted | | Not fitted | |
| 86 | 1 | 14A/5556 | Camera, F95 (4″ lens) | 1 | −23.62 | | | | |
| 126 | 2 | EB7.83.5217 | Nose platform | 1 | −23.17 | 4.30 | − 99.63 | 4.30 | − 99.63 |
| 87 | 2 | | Drift and tilt control | 1 | −23.15 | 4.00 | − 92.60 | 4.00 | − 92.60 |
| 128 | 2 | | Photographic sight | 1 | −23.19 | 15.84 | − 367.33 | | |
| 88 | 2 | 14A/4014 | Control units | 2 | −23.15 | 8.50 | − 196.78 | 8.50 | − 196.78 |
| 89 | 6 | | F95 Camera control unit | 1 | −17.31 | 3.28 | − 56.78 | | |
| 103 | 16 | 14A/2802 | Camera, F52 (36″ lens) | 2 | − 6.15 | | | | |
| 99 | 16 | 14A/988 | Motor, Type B | 2 | − 6.15 | | | | |
| 100 | 16 | 14A/3568 | Drive, Type C | 2 | − 6.15 | | | | |
| 94 | 16 | 14A/4130 | Adapter, No.5 | 2 | − 6.15 | | | | |
| 105 | 16 | 14A/4128 | Mounting, F52 | 2 | − 6.15 | | | | |
| 127 | 15 | 14A/2802 | Camera, F52 (36″ lens) | 2 | − 7.80 | | | | |
| 97 | 15 | 14A/988 | Motor, Type B | 2 | − 7.80 | | | | |
| 95 | 15 | 14A/3568 | Drive, Type C | 2 | − 7.80 | | | | |

*continued . . .*

**TABLE 4 Alternative load items (fig.5)** — *continued*

| Fig.5 Item No. | Bay | Ref. or Part No. | Description | Qty. | Arm (ft) | Fit 3 (Shipping Fit) Weight (lb) | Fit 3 (Shipping Fit) Moment (lb ft) | Fit 4 (Night Fit) Weight (lb) | Fit 4 (Night Fit) Moment (lb ft) |
|---|---|---|---|---|---|---|---|---|---|
| 113 | 15 | 14A/4130 | Adapter, No.5 | 2 | − 7.80 | | | | |
| 92 | 15 | 14A/4128 | Mounting, F52 | 2 | − 7.80 | | | | |
| 107 | 33 | 14A/5556 | Camera, F95 (4″ lens) | 1 | +16.81 | 16.00 | + 268.96 | | |
| 108 | 33 | 14A/5556 | Camera, F95 (12″ lens) | 1 | +16.81 | 21.50 | + 361.42 | | |
| 109 | 33 | EB7.83.5221/5219 | Support | 2 | +16.81 | 13.90 | + 233.66 | | |
| 106 | 27 | EA2.97.5003 | Auxiliary flare beam | 1 | + 9.10 | | | 178.00 | + 1619.80 |
| 120 | 28 | | Mini photoflash crate | 1 | +10.15 | | | 200.00 | + 2030.00 |
| 121 | 28 | 11A/4715 | Release unit No.3 | 1 | + 9.69 | | | 10.25 | + 99.32 |
| 119 | 28 | | Photoflashes | 60 | +10.15 | | | 103.00 | + 1045.45 |
| 122 | 16 | 14A/4592 | Camera, F97 | 2 | − 6.10 | | | 56.00 | − 341.60 |
| 124 | 16 | 14A/4599 | Adapter | 1 | − 6.10 | | | 0.31 | − 1.89 |
| 125 | 16 | EA2.83.5711 | Cable | 1 | − 6.10 | | | 0.66 | − 4.03 |
| 90 | 10 | 14A/4276 | F97 Camera control unit | 1 | −13.51 | | | 4.00 | − 54.04 |
| 129 | 2 | | T3/T4 Bombsight | 1 | −23.53 | | | 20.13 | − 473.75 |
| 117 | 40 | 27C/2379 | Survival packs | 2 | +26.49 | 88.00 | +2331.12 | 88.00 | + 2331.12 |
| | | | | | | 296.91 | + 3677.48 | 960.79 | +11061.06 |

TABLE 4 Alternative load items (fig.5) — *continued*

| Fig.5 Item No. | Bay | Ref. or Part No. | Description | Qty. | Arm (ft) | Fit 5 Standard Camera Fit with Dispenser system (without cartridges) Weight (lb) | Fit 5 Moment (lb ft) | Fit 6 Survey and Task Fit with Dispenser system (without cartridges) Weight (lb) | Fit 6 Moment (lb ft) |
|---|---|---|---|---|---|---|---|---|---|
| 116 | 38 | 14A/4133 | Camera, F49 (6" lens) | 1 | + 22.96 | 65.00 | + 1492.40 | 65.00 | + 1492.40 |
| 115 | 38 | 14A/3573 | Mounting, F49 | 1 | + 22.96 | 5.19 | + 119.16 | 5.19 | + 119.16 |
| *111 | 33 | 14A/2802 | Camera, F52 (36" lens) | 2 | + 16.81 | 168.50 | + 2832.49 | 168.50 | + 2832.49 |
| 114 | 33 | 14A/988 | Motor, Type B | 2 | + 16.81 | 7.39 | + 124.39 | 7.39 | + 124.23 |
| 112 | 33 | 14A/3568 | Drive, Type C | 2 | + 16.81 | 1.56 | + 26.22 | 1.56 | + 26.22 |
| 104 | 33 | 14A/4130 | Adapter, No.5 | 2 | + 16.81 | 13.00 | + 218.56 | 13.00 | + 218.56 |
| 118 | 33 | 14A/4128 | Mounting, F52 | 2 | + 16.81 | 23.00 | + 386.63 | 23.00 | + 386.63 |
| 101 | 16 | 14A/5556 | Camera, F95 (4" lens) | 1 | - 6.15 | 16.00 | - 98.40 | | |
| 102 | 16 | 14A/5556 | Camera, F95 (12" lens) | 1 | - 6.15 | 21.50 | - 132.23 | | |
| 123 | 16 | EB7.83.5221/5219 | Support | 2 | - 6.15 | 13.90 | - 85.49 | | |
| 93 | 15 | 14A/2802 | Camera, F52 (48" lens) oblique | 1 | - 7.80 | Not fitted | | | |
| 98 | 15 | 14A/988 | Motor, Type B | 1 | - 7.80 | Not fitted | | | |
| 96 | 15 | 14A/3568 | Drive, Type C | 1 | - 7.80 | Not fitted | | | |
| 110 | 15 | 14A/4130 | Adapter, No.5 | 1 | - 7.80 | Not fitted | | | |
| 91 | 15 | 14A/4128 | Mounting, F52 | 1 | - 7.80 | Not fitted | | | |
| 86 | 1 | 14A/5556 | Camera, F95 (4" lens) | 1 | - 23.62 | 16.00 | - 377.92 | 16.00 | - 377.92 |
| 126 | 2 | EB7.83.5217 | Nose platform | 1 | - 23.17 | 4.30 | - 99.63 | 4.30 | - 99.63 |
| 87 | 2 | | Drift and tilt control | 1 | - 23.15 | 4.00 | - 92.60 | 4.00 | - 92.60 |
| 128 | 2 | | Photographic sight | 1 | - 23.19 | 15.84 | - 367.33 | 15.84 | - 367.33 |
| 88 | 2 | 14A/4014 | Control units | 2 | - 23.15 | 8.50 | - 196.78 | 8.50 | - 196.78 |
| 89 | 6 | | F95 Camera control unit | 1 | - 17.31 | 3.28 | - 56.78 | 3.28 | - 56.78 |
| 103 | 16 | 14A/2802 | Camera, F52 (36" lens) | 2 | - 6.15 | | | 168.50 | - 1036.27 |
| 99 | 16 | 14A/988 | Motor, Type B | 2 | - 6.15 | | | 7.39 | - 45.45 |
| 100 | 16 | 14A/3568 | Drive, Type C | 2 | - 6.15 | | | 1.56 | - 9.59 |
| 94 | 16 | 14A/4130 | Adapter, No.5 | 2 | - 6.15 | | | 13.00 | - 79.95 |
| 105 | 16 | 14A/4128 | Mounting, F52 | 2 | - 6.15 | | | 23.00 | - 141.45 |
| 127* | 15 | 14A/2802 | Camera, F52 (36" lens) | 2 | - 7.80 | | | 168.50 | - 1314.30 |
| 97 | 15 | 14A/988 | Motor, Type B | 2 | - 7.80 | | | 7.39 | - 57.64 |
| 95 | 15 | 14A/3568 | Drive, Type C | 2 | - 7.80 | | | 1.56 | - 12.17 |

*continued . . .*

TABLE 4 Alternative load items (fig.5) — *continued*

| Fig.5 Item No. | Bay | Ref. or Part No. | Description | Qty. | Arm (ft) | Fit 5 Standard Camera Fit with Dispenser system (without cartridges) Weight (lb) | Fit 5 Standard Camera Fit with Dispenser system (without cartridges) Moment (lb ft) | Fit 6 Survey and Task Fit with Dispenser system (without cartridges) Weight (lb) | Fit 6 Survey and Task Fit with Dispenser system (without cartridges) Moment (lb ft) |
|---|---|---|---|---|---|---|---|---|---|
| 113 | 15 | 14A/4130 | Adapter, No.5 | 2 | – 7.80 | | | 13.00 | – 101.40 |
| 92 | 15 | 14A/4128 | Mounting, F52 | 2 | – 7.80 | | | 23.00 | – 179.40 |
| 107 | 33 | 14A/5556 | Camera, F95 (4" lens) | 1 | + 16.81 | | | | |
| 108 | 33 | 14A/5556 | Camera, F95 (12" lens) | 1 | + 16.81 | | | | |
| 109 | 33 | EB7.83.5221/5219 | Support | 2 | + 16.81 | | | | |
| 106 | 27 | EA2.97.5003 | Auxiliary flare beam | 1 | + 9.10 | | | | |
| 120 | 28 | | Mini photoflash crate | 1 | + 10.15 | | | | |
| 121 | 28 | 11A/4715 | Release unit No.3 | 1 | + 9.69 | | | | |
| 119 | 28 | | Photoflashes | 60 | + 10.15 | | | | |
| 122 | 16 | 14A/4592 | Camera, F97 | 2 | – 6.10 | | | | |
| 124 | 16 | 14A/4599 | Adapter | 1 | – 6.10 | | | | |
| 125 | 16 | EA2.83.5711 | Cable | 1 | – 6.10 | | | | |
| 90 | 10 | 14A/4276 | F97 Camera control unit | 1 | – 13.51 | | | | |
| 129 | 2 | | T3/T4 Bombsight | 1 | – 23.53 | | | | |
| 117 | 40 | 27C/2379 | Survival packs | 2 | + 26.49 | 88.00 | + 2331.12 | 88.00 | + 2331.12 |
| 105C | | EG7-84-1 | Wing tip pod assy (port) | 1 | + 4.54 | 249.00 | + 1130.46 | 249.00 | + 1130.46 |
| 105C | | EG7-84-2 | Wing tip pod assy (stbd) | 1 | + 4.54 | 249.00 | + 1130.46 | 249.00 | + 1130.46 |
| 121A | | 7B/2587 | Discharger cartridge Mk.4 Matrix | 6 | + 6.49 | 75.00 | + 486.75 | 75.00 | + 486.75 |
| 121A | | 7B/2590 | Distributor unit RBW | 2 | + 6.61 | 24.00 | + 158.64 | 24.00 | + 158.64 |
| 105A | | 10AS/9528340 | Stripper, countermeasure, chaff | 2 | + 0.35 | 82.00 | + 28.70 | 82.00 | + 28.70 |
| 105B | | | Conventional window | | + 2.63 | 310.00 | + 815.30 | 310.00 | + 815.30 |
| 121A | | EG7-84-1301 | Plate Blanking | 6 | + 6.49 | 7.17 | + 46.53 | 7.17 | + 46.53 |
| | | | | | | 1471.13 | + 9820.65 | 1846.63 | + 7158.99 |

*continued . . .*

TABLE 4 Alternative load items (fig.5) — *continued*

| Fig.5 Item No. | Bay | Ref. or Part No. | Description | Qty. | Arm (ft) | Fit 7 Shipping Fit with Dispenser system (without cartridges) Weight (lb) | Fit 7 Shipping Fit with Dispenser system (without cartridges) Moment (lb ft) | Fit 8 Night Fit with Dispenser system (without cartridges) Weight (lb) | Fit 8 Night Fit with Dispenser system (without cartridges) Moment (lb ft) |
|---|---|---|---|---|---|---|---|---|---|
| 116 | 38 | 14A/4133 | Camera, F49 (6" lens) | 1 | + 22.96 | 65.00 | + 1492.40 | 65.00 | + 1492.40 |
| 115 | 38 | 14A/3573 | Mounting, F49 | 1 | + 22.96 | 5.19 | + 119.16 | 5.19 | + 119.16 |
| *111 | 33 | 14A/2802 | Camera, F52 (36" lens) | 2 | + 16.81 | | | 168.50 | + 2832.49 |
| 114 | 33 | 14A/988 | Motor, Type B | 2 | + 16.81 | | | 7.39 | + 124.23 |
| 112 | 33 | 14A/3568 | Drive, Type C | 2 | + 16.81 | | | 1.56 | + 26.22 |
| 104 | 33 | 14A/4130 | Adapter, No.5 | 2 | + 16.81 | | | 13.00 | + 218.56 |
| 118 | 33 | 14A/4128 | Mounting, F52 | 2 | + 16.81 | | | 23.00 | + 386.63 |
| 101 | 16 | 14A/5556 | Camera, F95 (4" lens) | 1 | - 6.15 | 16.00 | - 98.40 | | |
| 102 | 16 | 14A/5556 | Camera, F95 (12" lens) | 1 | - 6.15 | 21.50 | - 132.23 | | |
| 123 | 16 | EB7.83.5221/5219 | Support | 2 | - 6.15 | 13.90 | - 85.49 | | |
| 93 | 15 | 14A/2802 | Camera, F52 (48" lens) oblique | 1 | - 7.80 | Not fitted | | Not fitted | |
| 98 | 15 | 14A/988 | Motor, Type B | 1 | - 7.80 | Not fitted | | Not fitted | |
| 96 | 15 | 14A/3568 | Drive, Type C | 1 | - 7.80 | Not fitted | | Not fitted | |
| 110 | 15 | 14A/4130 | Adapter, No.5 | 1 | - 7.80 | Not fitted | | Not fitted | |
| 91 | 15 | 14A/4128 | Mounting, F52 | 1 | - 7.80 | Not fitted | | Not fitted | |
| 86 | 1 | 14A/5556 | Camera, F95 (4" lens) | 1 | - 23.62 | | | | |
| 126 | 2 | EB7.83.5217 | Nose platform | 1 | - 23.17 | 4.30 | - 99.63 | 4.30 | - 99.63 |
| 87 | 2 | | Drift and tilt control | 1 | - 23.15 | 4.00 | - 92.60 | 4.00 | - 92.60 |
| 128 | 2 | | Photographic sight | 1 | - 23.19 | 15.84 | - 367.33 | | |
| 88 | 2 | 14A/4014 | Control units | 2 | - 23.15 | 8.50 | - 196.78 | 8.50 | - 196.78 |
| 89 | 6 | | F95 Camera control unit | 1 | - 17.31 | 3.28 | - 56.78 | | |
| 103 | 16 | 14A/2802 | Camera, F52 (36" lens) | 2 | - 6.15 | | | | |
| 99 | 16 | 14A/988 | Motor, Type B | 2 | - 6.15 | | | | |
| 100 | 16 | 14A/3568 | Drive, Type C | 2 | - 6.15 | | | | |
| 94 | 16 | 14A/4130 | Adapter, No.5 | 2 | - 6.15 | | | | |
| 105 | 16 | 14A/4128 | Mounting, F52 | 2 | - 6.15 | | | | |
| 127 | 15 | 14A/2802 | Camera, F52 (36" lens) | 2 | - 7.80 | | | | |
| 97 | 15 | 14A/988 | Motor, Type B | 2 | - 7.80 | | | | |
| 95 | 15 | 14A/3568 | Drive, Type C | 2 | - 7.80 | | | | |

*continued . . .*

TABLE 4 Alternative load items (fig.5) — *continued*

| Fig.5 Item No. | Bay | Ref. or Part No. | Description | Qty. | Arm (ft) | Fit 7 Shipping Fit with Dispenser system (without cartridges) Weight (lb) | Fit 7 Shipping Fit with Dispenser system (without cartridges) Moment (lb ft) | Fit 8 Night Fit with Dispenser system (without cartridges) Weight (lb) | Fit 8 Night Fit with Dispenser system (without cartridges) Moment (lb ft) |
|---|---|---|---|---|---|---|---|---|---|
| 113 | 15 | 14A/4130 | Adapter, No.5 | 2 | – 7.80 | | | | |
| 92 | 15 | 14A/4128 | Mounting, F52 | 2 | – 7.80 | | | | |
| 107 | 33 | 14A/5556 | Camera, F95 (4" lens) | 1 | + 16.81 | 16.00 | + 268.96 | | |
| 108 | 33 | 14A/5556 | Camera, F95 (12" lens) | 1 | + 16.81 | 21.50 | + 361.42 | | |
| 109 | 33 | EB7.83.5221/5219 | Support | 2 | + 16.81 | 13.90 | + 233.66 | | |
| 106 | 27 | EA2.97.5003 | Auxiliary flare beam | 1 | + 9.10 | | | 178.00 | + 1619.80 |
| 120 | 28 | | Mini photoflash crate | 1 | + 10.15 | | | 200.00 | + 2030.00 |
| 121 | 28 | 11A/4715 | Release unit No.3 | 1 | + 9.69 | | | 10.25 | + 99.32 |
| 119 | 28 | | Photoflashes | 60 | + 10.15 | | | 103.00 | + 1045.45 |
| 122 | 16 | 14A/4592 | Camera, F97 | 2 | – 6.10 | | | 56.00 | – 341.60 |
| 124 | 16 | 14A/4599 | Adapter | 1 | – 6.10 | | | 0.31 | – 1.89 |
| 125 | 16 | EA2.83.5711 | Cable | 1 | – 6.10 | | | 0.66 | – 4.03 |
| 90 | 10 | 14A/4276 | F97 Camera control unit | 1 | – 13.51 | | | 4.00 | – 54.04 |
| 129 | 2 | | T3/T4 Bombsight | 1 | – 23.53 | | | 20.13 | – 473.75 |
| 117 | 40 | 27C/2379 | Survival packs | 2 | + 26.49 | 88.00 | + 2331.12 | 88.00 | + 2331.12 |
| 105C | | EG7-84-1 | Wing tip pod assy. (port) | 1 | + 4.54 | 249.00 | + 1130.46 | 249.00 | + 1130.46 |
| 105C | | EG7-84-2 | Wing tip pod assy. (stbd) | 1 | + 4.54 | 249.00 | + 1130.46 | 249.00 | + 1130.46 |
| 121A | | 7B/2587 | Discharger cartridge Mk.1 Matrix | 6 | + 6.49 | 75.00 | + 486.75 | 75.00 | + 486.75 |
| 121A | | 7B/2590 | Distributor unit RBW | 2 | + 6.61 | 24.00 | + 158.68 | 24.00 | + 158.68 |
| 105A | | 10AS/9528340 | Stripper counter measure, chaff | 2 | + 0.35 | 82.00 | + 28.70 | 82.00 | + 28.70 |
| 105B | | | Conventional window | | + 2.63 | 310.00 | + 815.30 | 310.00 | + 815.30 |
| 121A | | EG7-84-1301 | Plate blanking | 6 | + 6.49 | 7.17 | + 46.53 | 7.17 | + 46.53 |
| | | | | | | 1293.08 | + 7474.36 | 1956.96 | +14857.94 |

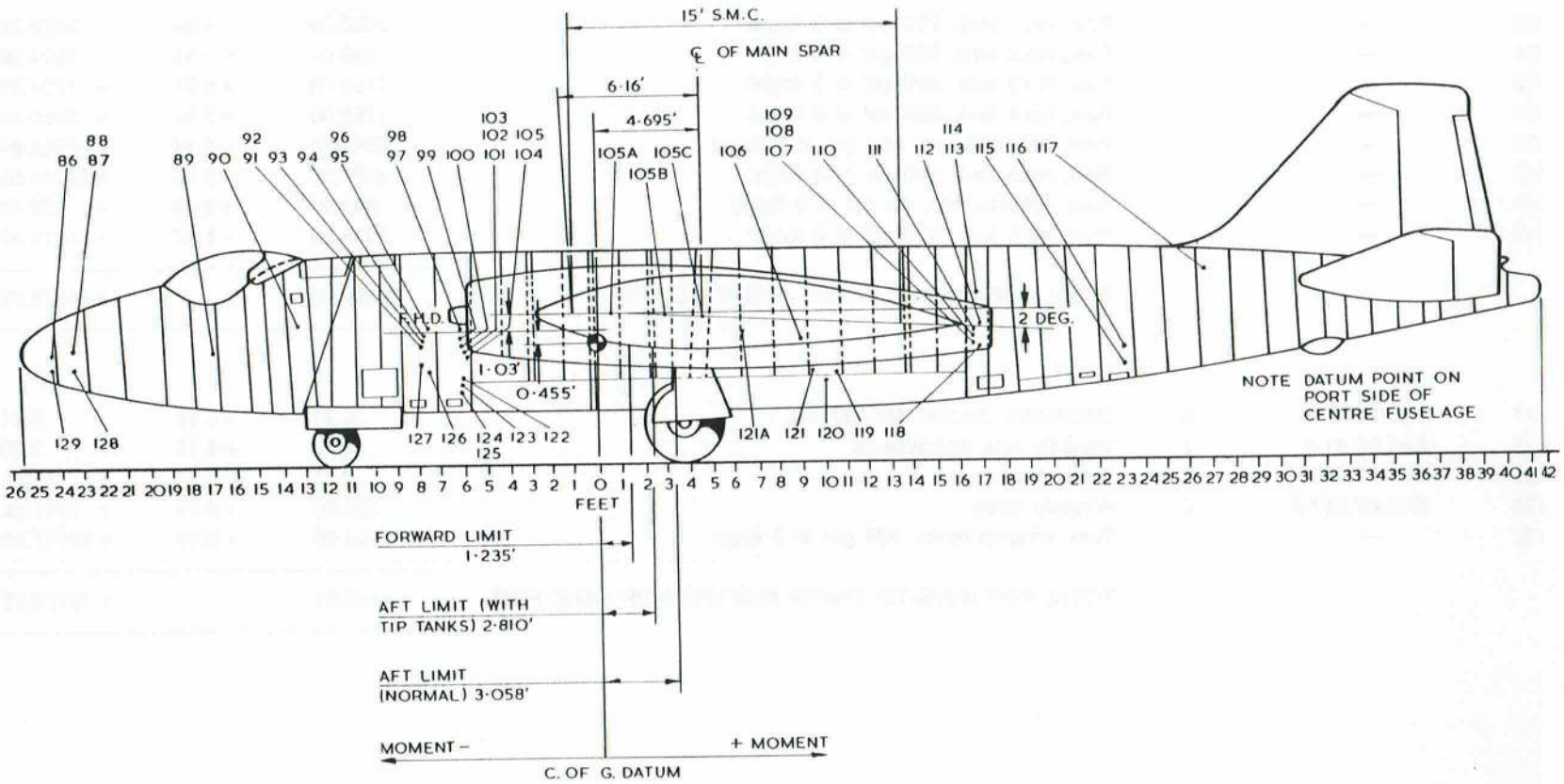


FIG. 5. LOADING AND C.G. DIAGRAM – ALTERNATIVE LOAD ITEMS

◀ ITEMS 105A,105B,105C AND 121A ADDED ▶

## TABLE 5

### Disposable and consumable load items (fig.6)

| Fig.6 Item No. | Ref. or Part No. | Qty. | Description | Weight (lb) | Arm (ft) | Moment (lb ft) |
|---|---|---|---|---|---|---|
| 130 | — | | Fuel, No.1 tank, 260 gal at 8 lb/gal | 2080.00 | −4.24 | − 8819.20 |
| 131 | — | | Fuel, No.2 tank, 260 gal at 8 lb/gal | 2080.00 | −1.55 | − 3224.00 |
| 132 | — | | Fuel, No.3 tank, 220 gal at 8 lb/gal | 1760.00 | +0.97 | + 1707.20 |
| 134 | — | | Fuel, No.4 tank, 220 gal at 8 lb/gal | 1760.00 | +3.33 | + 5860.80 |
| 133 | — | | Fuel, integral tanks, 856 gal at 8 lb/gal | 6848.00 | +2.18 | +14928.64 |
| 140 | — | | Fuel, No.5 tank, 540 gal at 8 lb/gal | 4320.00 | +9.13 | +39441.60 |
| 141 | — | | Fuel, collector box, 45 gal at 8 lb/gal | 360.00 | +2.64 | + 950.40 |
| 142 | — | | Fuel, No.6 tank, 372 gal at 8 lb/gal | 2976.00 | −1.57 | − 4672.32 |
| | | | TOTAL FOR FUEL IN WINGS AND FUSELAGE | 22184.00 | | +46173.12 |
| 137 | 12G/1279 | 6 | Detonators, electric, No.109, Mk.1 | 0.13 | +4.15 | + 0.54 |
| 135 | EA1.00.81-2 | 2 | Wing-tip tank attachments | 0.73 | +4.10 | + 2.99 |
| 136 | EA1.20.2031 | 6 | Bolts, explosive | 2.75 | +4.16 | + 11.44 |
| 138 | EA3.62.217-8 | 2 | Wing-tip tanks | 238.00 | +4.25 | + 1011.50 |
| 139 | — | | Fuel, wing-tip tanks, 488 gal at 8 lb/gal | 3904.00 | +3.88 | +15147.52 |
| | | | TOTAL FOR WING-TIP TANKS AND WING-TIP TANK FUEL | 4145.61 | | +16173.99 |

UK RESTRICTED

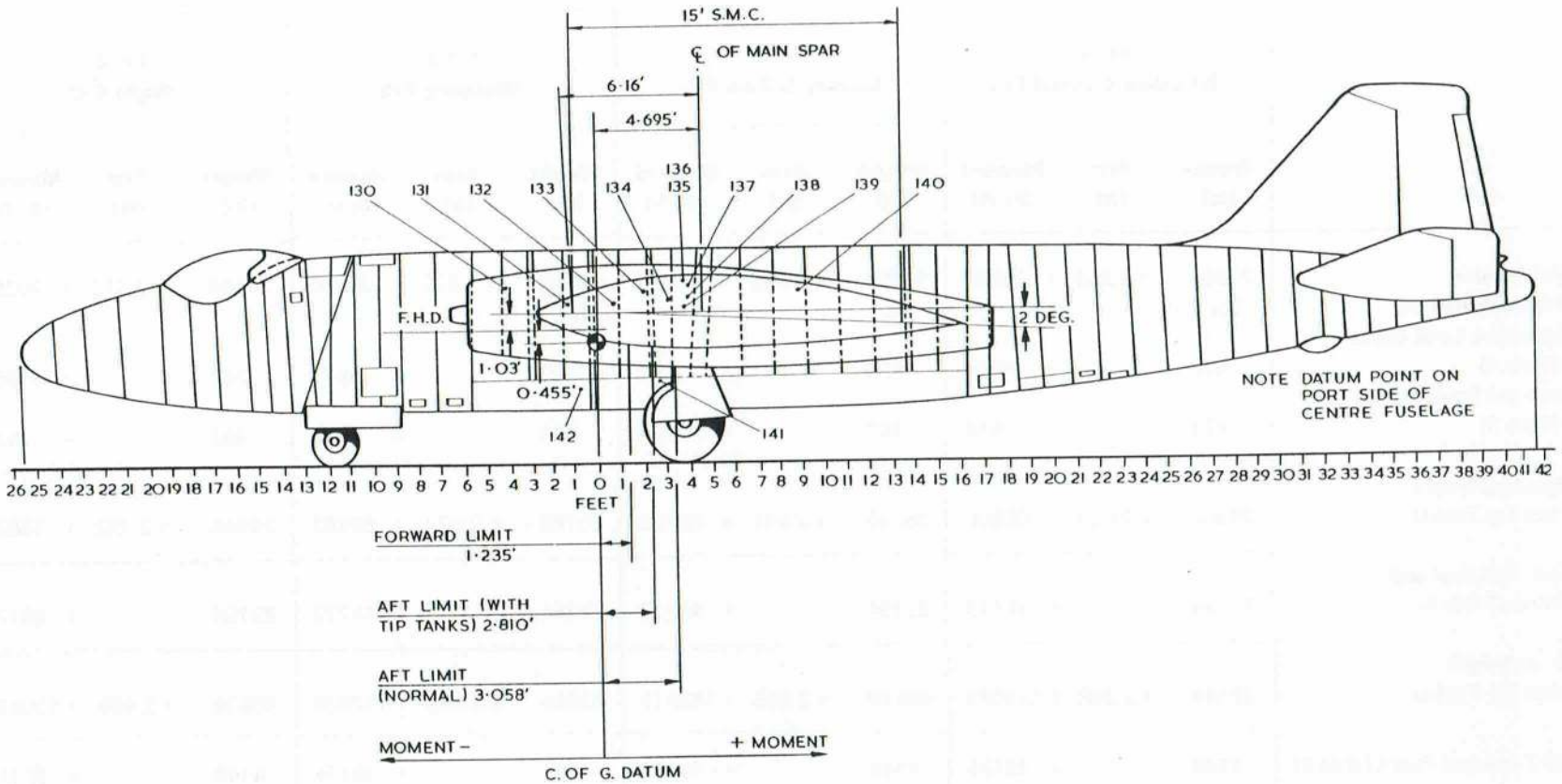


FIG. 6. LOADING AND C.G. DIAGRAM - EXPENDABLE LOAD ITEMS

TABLE 6

All-up weight summary

| | Fit 1 (Standard Cameral Fit) | | | Fit 2 (Survey & Task Fit) | | | Fit 3 (Shipping Fit) | | | Fit 4 (Night Fit) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Weight (lb) | Arm (ft) | Moment (lb ft) | Weight (lb) | Arm (ft) | Moment (lb ft) | Weight (lb) | Arm (ft) | Moment (lb ft) | Weight (lb) | Arm (ft) | Moment (lb ft) |
| Basic Weight | 24994 | +2.812 | + 70290 | 24994 | +2.812 | + 70290 | 24994 | +2.812 | + 70290 | 24994 | +2.812 | + 70290 |
| Adjustable Ballast | Nil | | | Nil | | | Nil | | | Nil | | |
| Alternative Load Items (Table 4) | 475 | | + 6024 | 850 | | + 3362 | 297 | | + 3677 | 961 | | + 11061 |
| Crew and Equipment (Table 3) | 491 | | – 7514 | 491 | | – 7514 | 491 | | – 7514 | 491 | | – 7514 |
| Operating Weight (less Tip Tanks) | 25960 | +2.650 | + 68800 | 26335 | +2.511 | + 66138 | 25782 | +2.577 | + 66453 | 26446 | +2.792 | + 73837 |
| Fuel:- Fuselage and Wings (Table 5) | 22184 | | + 46173 | 22184 | | + 46173 | 22184 | | + 46173 | 22184 | | + 46173 |
| All-up Weight (less Tip Tanks) | 48144 | +2.388 | + 114973 | 48519 | +2.315 | + 112311 | 47966 | +2.348 | + 112626 | 48630 | +2.468 | + 120010 |
| Tip Tanks and Fuel (Table 5) | 4146 | | + 16174 | 4146 | | + 16174 | 4146 | | + 16174 | 4146 | | + 16174 |
| All-up Weight (including Tip Tanks) | 52290 | +2.508 | + 131147 | 52665 | +2.440 | + 128485 | 52112 | +2.472 | + 128800 | 52776 | +2.580 | + 136184 |

*continued . . .*

TABLE 6 All-up weight summary — *continued*

| | Fit 5 (Standard Cameral Fit) with chaff Dispensers | | | Fit 6 (Survey & Task Fit) with chaff Dispensers | | | Fit 7 (Shipping Fit) with chaff Dispensers | | | Fit 8 (Night Fit) with chaff Dispensers | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Weight (lb) | Arm (ft) | Moment (lb ft) | Weight (lb) | Arm (ft) | Moment (lb ft) | Weight (lb) | Arm (ft) | Moment (lb ft) | Weight (lb) | Arm (ft) | Moment (lb ft) |
| Basic Weight | 24994 | + 2.812 | + 70290 | 24994 | + 2.812 | + 70290 | 24994 | + 2.812 | + 70290 | 24994 | + 2.812 | + 70290 |
| Adjustable Ballast | Nil | | | Nil | | | Nil | | | Nil | | |
| Alternative Load Items (Table 4) | 1471 | | + 9821 | 1847 | | + 7159 | 1293 | | + 7474 | 1957 | | + 14858 |
| Crew and Equipment (Table 3) | 491 | | – 7514 | 491 | | – 7514 | 491 | | – 7514 | 491 | | – 7514 |
| Operating Weight | 26956 | + 2.693 | + 72597 | 27332 | + 2.559 | + 69935 | 26778 | + 2.623 | + 70250 | 27442 | + 2.829 | + 77634 |
| Fuel:- Fuselage and Wings (Table 5) | 22184 | | + 46173 | 22184 | | + 46173 | 22184 | | + 46173 | 22184 | | + 46173 |
| All-up Weight | 49140 | + 2.417 | + 118770 | 49516 | + 2.345 | + 116108 | 48962 | + 2.378 | + 116423 | 49626 | + 2.495 | + 123807 |

◀ *Intentionally blank* ▶

# LETHAL WARNING

## ENTRY INTO CABIN

Before entering the cabin, personnel must report to the N.C.O. i/c the aircraft, who will ensure that all the relevant safety precautions have been taken.

## ASSISTED ESCAPE SYSTEM

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 detailing the responsibilities and positioning of the assisted escape system safety devices are to be strictly adhered to:-

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

R.A.F. Lethal Warnings contained in the A.P.101B-0400-5A2, Safety and Servicing Notes.

3. Additional information concerning assisted escape system safety device positioning is to be found in the Aircraft Servicing Schedules A.P.101B-0407-5 and A.D.5037 series of Air Diagrams.

## GENERAL

| | | |
|---|---|---|
| CANOPY JETTISON | : | EXPLOSIVE BOLTS |
| CREW HATCH JETTISON | : | EXPLOSIVE BOLTS |
| CONTROL COLUMN RELEASE | : | EXPLOSIVE COLLAR |
| WING TIP TANK JETTISON | : | EXPLOSIVE BOLTS |

Personnel are warned not to interfere with the controls associated with this equipment unless the following precautions have been carried out:-

(a) The internal service batteries and the detonator-circuit emergency batteries are disconnected and no ground electrical supply is connected to the external supply socket.

(b) The detonator leads are disconnected where necessary.

(c) The detonators are removed where necessary.

**Note. . .**

*Detonators are not to be held in the hand. During all operations, detonators must be supported by their electrical leads. Hold the leads near the detonator base. THIS IS MOST IMPORTANT.*

## FUEL TANK NO.6 EXPLOSION PROTECTION SYSTEM

4. This system includes detonators which are installed in the No.6 fuel tank. Personnel are warned not to interfere with the controls associated with this system, or attempt to remove the tank, unless the internal service battery is disconnected and no ground electrical supply is connected to the external supply socket.

**Note. . .**

*These detonators are explosive and must be handled with care. They should be kept away from heat applications, electrical leads, sockets, and batteries and not exposed to severe blows or undue force when fitting.*

## ELECTROMAGNETIC COMPATABILITY

5. The electrically-initiated explosive devices listed below are screened and therefore not potentially dangerous as long as they remain in situ, regardless of whether or not H.F. radio or radar equipment is being operated; this also applies to correctly stowed engine starter cartridges.

Canopy and hatch explosive bolts — Elevator control rod explosive collar
Wing-tip tank explosive bolts — Engine starter cartridges
Fire-extinguishers cartridges

These devices become potentially lethal however, during loading/unloading, while H.F. radio or radar equipment is in operation. Therefore:-

(1) Stores having electrically-initiated explosive devices must not be loaded/unloaded during operation of H.F. radio or radar equipment.

(2) H.F. radio or radar equipment must not be operated during the loading/unloading of the type of stores as in (1).

(3) Stowed starter cartridges must not be allowed to contact metallic objects while H.F. radio or radar equipment is in operation.

## HIGH ENERGY IGNITERS

6. The energy stored in the capacitors of the high energy igniter units can 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.

## HIGH VOLTAGE ELECTRICAL SYSTEMS

7. Voltages in excess of 30 volts (R.M.S.) a.c. or 50 volts d.c. can in certain circumstances be lethal. When working on such systems requiring the exposure of live terminals, a second tradesman is always to be in attendance.

# Chapter 3A – FATIGUE INDEX DATA

## LIST OF CONTENTS



## LIST OF TABLES

## INTRODUCTION

### General

1. Every aircraft structure suffers fatigue damage accumulatively, from pilot induced manoeuvres, from gust effects resulting from flight through turbulent air, and from undercarriage-to-wing load transference during the ground-air-ground cycle of take-off and landing. Because of this, each type of aircraft has a safe fatigue life stated which, when expired, will cause the aircraft to be withdrawn from service, or modified to allow further flying. The declared safe life may be evolved, initially, from calculations but is usually confirmed by full scale fatigue testing. The consumption of fatigue life is monitored as each aircraft is flown in order to ensure that the declared safe fatigue life is not exceeded.

### Fatigue Index

2. Fatigue life consumed is measured in terms of 'fatigue index' (F.I.) which is a non-dimensional number, calculated either from fatigue meter readings, of by converting sortie hours flown using appropriate fatigue index rates (F.I./hr). Generally the fully consumed fatigue life of an aircraft is represented by a fatigue index of 100 but in special circumstances, e.g., following a modification to the aircraft, or re-testing of the structure to revised land spectra, a figure in excess of 100 may be quoted as the fully consumed limit. Also, where major components such as wings, tailplanes, and fins are considered to be interchangeable, it will be necessary to evaluate their individual limiting fatigue lives relative to that of the original critical component establishment by the fatigue test. The aircraft limiting F.I. will then have to be identified with the least of all such valves. The methods of calculating F.I. are described in the following two paragraphs and at the end of this chapter.

### Assessing fatigue life consumption

3. The most accurate method of determining the F.I. consumed, due to gust and manoeuvreing effects is by using a fatigue meter. This instrument records on counters the number of times that 'g' thresholds of a pre-determined series of levels are reached or exceeded. By entering the difference values of the counters over a period of flying time into a formula, together with the appropriate numbers of roller and full-stop landings, the incremental F.I. consumption for the period can be calculated. One aircraft type may have several formulae to cover variations in operating role, average all-up weights, or the fitment of different types of fatigue meter. Alternatively, average all up weight variations may be covered by the use of different weight factors inserted into the fatigue formulae.

### Unmetered flying

4. For the periods prior to the fitment of fatigue meters, or when an installed meter is unserviceable, fatigue consumption is assessed from details of the flying patterns flown and is dependent upon the type of aircraft manoeuvres and theatre of operations. This assessment enables the design authority to estimate fatigue index consumption rates which, related to hours flown, enables the F.I. consumed for each sortie to be calculated. Because fatigue damage estimates based on sortie patterns are derived from average expected loadings, the F.I. rates are factored to allow for 'worst case' situations. Thus, fatigue consumption assessed on a sortie pattern basis is wasteful when compared with the more accurate fatigue meter based index. Hence, it is essential to give priority to the replacement of defective fatigue meters.

### Flight patterns

5. The fatigue formulae and fatigue index rate values, for use during periods of fatigue meter unserviceability are compiled in conjunction with some of the flight details given in the 'Statement of Intent' which forms Part 2 of flying 'Patterns and Fatigue Parameters'. This document describes the various sortie patterns to which aircraft are generally expected to fly in terms of average weight, altitude, duration, percentage utilization, etc. Each of the complete sorties is summarized under a descriptive title and allocated a sortie pattern code number on the reverse side of the M.O.D. Form 725. The above parameters form the basis of fatigue consumption studies on major aircraft components other than the main wing attachment on the fuselage, the fatigue life of which is related directly to fatigue meter counts. In both contexts damage levels attributable to any particular mode or modes of flying can be isolated by use of the recorded sortie code number.

It follows that any significant proposed change to a sortie pattern should be referred to the 'Statement of Intent' issuing authority via Air Eng. 30b.

### Recording of fatigue data

6. The recording of flight data sortie codes and fatigue meter counts is made currently on M.O.D. Form 725 (Canberra) (ADP) (Revised Sept. 1983), the format of which has been adapted for Automatic Data Processing Techniques. Instructions on the use of this form are given in M.O.D. Form 799/4 (Canberra) (ADP) (Revised Sept. 1983). The in-use form is kept in the aircraft M.O.D. Form 700 and on completion, after four separately recorded flights, is processed at Station Level to yield incremental values of Fatigue Index, Landings, Cabin Pressurizations and other data to add to previously accumulated totals. A month by month

return is made from these totals on STC Form STATS 2062 (revised June 1984) as a statistical monitor of average F.I. rate per mark and of individual aircraft F.I. remaining.

7. The aircraft captain is responsible for completing the sortie details, whilst servicing personnel are responsible for reading fatigue meters and recording the information on M.O.D. Form 725 (Canberra) (ADP). All personnel responsible for the collection and compilation of fatigue data must appreciate the need for accuracy and legibility of the entries. Careless or incomplete recording is dangerous if it causes a less damaging sortie to be recorded. It is also wasteful, if, in the interests of safety, the worst case has subsequently to be assumed. In extreme cases continued carelessness or incomplete recordings can result in the premature retirement of an aircraft because of doubt regarding the true F.I. situation.

8. All personnel responsible for reading fatigue meters are to be familiar with, and are to apply, the serviceability checks described in AP112G-0203-1, Chapter 2. In particular, the validity of fatigue meter readings are to be checked either before any fatigue life calculations are undertaken at the unit, or before M.O.D. Form 725 is despatched from the unit for fatigue calculations to be performed elsewhere. The replacement of unserviceable meters is to be regarded as a high priority task.

**Refining of Fatigue Index**

9. During the period of the Canberra Refurbishing Programme, 1978 to 1982, a parallel detailed exercise was undertaken by the A.D.A. to re-assess the flying and fatigue records of all flying Canberras. Account was taken of all special manoeuvres and allowances made to include the ground-air-ground effect on all pre-metered and metered flying. Refined totals of flying hours, landings, cabin pressurizations and F.I. were issued on a Company's marker Form 725 together with the allowable F.I. for each aircraft.

Consistent with the replacement of the fuselage Centre Section Forging, (C.S.F.) which, (if not already achieved at an earlier date), was carried out during the refurbishing programme, together with the associated repair and inspection programme, agreement was reached with R.A.E. Structures Department, to extend the allowable F.I. for the Canberra to 133. For some aircraft, however, because of special circumstances, the allowable F.I. is quoted at a value less than 133. (See para.16)

When the fatigue records for an aircraft show that it has consumed 80 per cent of its allowable F.I., action is to be taken in accordance with AP100B-01 ORDER 0786, paragraphs 10 and 11. It should be noted that the return of completed Forms 725 should be limited only to those accumulated since the Refurbishing Assessment, identified by the maker Form 725 issued by B.Ae. and filed with the completed forms.

**Note . . .**

*Previously fatigue data was recorded on the following documents:*

Entries in the Form 700
F.D.S. 1 and 2
Forms 4832 A and B
Forms 4832 A and B (Revised May, 1966)
Form 725/1 and Form 725/2 (Canberra) (Nov. 1970) (provisional issue)
M.O.D. Form 725 (Canberra) (Jan. 1972 issue)
M.O.D. Form 725 (Canberra) (Revised Nov. 1978)
M.O.D. Form 725 (Canberra) (ADP) (Revised Sept. 1983)

Collectively, these documents represent the complete fatigue history of the aircraft and therefore must be preserved intact for possible future reference.

Whenever a mainplane is removed from a refurbished or non-refurbished aircraft for retention as a spare, the above records, or copies of them, should be identified with that mainplane and be available to complete the fatigue history of any new aircraft combination.

**Action on fitment of a new fatigue meter**

10. When a fatigue meter is changed the current M.O.D. Form 725 is to be closed and a new form raised. Block 1 of the new sheet is to be used to record the new meter window readings and the values of total flying hours and landings brought forward from the closed sheet. Further flying is recorded under Block 2. Refer to M.O.D. Form 7994 (Canberra) (ADP) (Revised Sept. 1983), paras. 4 and 5.

The checks specified in AP112G-0203-1, Chapter 2, are to be applied after three hours of flight have been completed with a new or replacement meter installed.

## APPLICATION

### General

**11.** The fatigue life of the Canberra was originally based on calculations for the high altitude bomber role. However, later operations included low level loft bombing roles producing increased flight loading so a full scale fatigue test was carried out.

**12.** Prior to the fitment of a fatigue meter, the fatigue consumption was assessed by factoring the flying hours according to the sortie flown. This produced a result called "Fatigue hours". These were subsequently expressed as a percentage of a 20,000 hour datum life, and the result quoted in terms of fatigue index (F.I.). At the refurbishing fatigue record assessment all of this earlier flying assessment had to be further modified to take account of the ground-air-ground (G.A.G.) cycle with resultant increases in F.I. consumed.

### Fatigue lives

**13.** The critical component on test proved to be the fuselage Centre Section Forging (C.S.F.) with the failure of the port front lower boom lug at the wing pick-up point. This was repaired and the test continued until failure occurred at the corresponding lug on the starboard side of the C.S.F.

**14.** Based on the geometric mean of the load cycles to failure, of the two test results a particular Safe Life was determined for Canberra aircraft flying in a similar manner to the test flight profiles, or from spectra plotted from actual fatigue meter counts. Safe lives for the other Canberra variants in aircraft weight, speed, altitude etc., have been derived by application of the theory of cumulative damage. In certain cases, where no fatigue meter readings are available for revised forms of flying, the safe life has had to be determined from step by step analysis of the sortie flight profiles. By further extensions of the above procedures, fatigue meter formulae and F.I. rates have been derived which express the safe life in terms of the fully consumed F.I.

**15.** Thus the fully consumed F.I. index for all original build Canberra is 100 F.I. and is based on the above mentioned failures of the C.S.F. main attachment lugs. However, because of structural integrity considerations associated with stress corrosion damage, a C.S.F. replacement programme was undertaken on all long term Canberras.

By agreement with R.A.E. Structures the remainder of the tested airframes with a replacement C.S.F. fitted, could be allowed to go to a revised limiting F.I. of 133, the equivalent of the second test failure mentioned above.

**16.** It follows that all mainplanes have a limiting F.I. of 133 but because certain components were removed, or not representatively loaded during the main fatigue test, revised calculated F.I.'s were allocated to these as follows:–

| | |
|---|---|
| Fin | 160 F.I. |
| Tailplane and Attachments | 200 F.I. |
| Front Transport Joint Cleats | 231 F.I. |

The replacement C.S.F. still has an allowable fatigue life of 100 F.I. based on the original test results. Therefore, if the total consumed fatigue life of an aircraft is less than 33 at C.S.F. replacement, then the revised allowable F.I. of that aircraft, post replacement, is that value of F.I. plus 100 for the new forging, a total value which will be less than 133. For such aircraft the maximum value of 133 F.I. could only be achieved by a second C.S.F. change.

### Cabin life

**17.** Based on a full scale test carried out in 1975 a revised datum life for the pressure cabin has been established as 12,900 full pressurizations. This represents a very large increase in cabin life compared to the previously quoted value but it is applicable only to those variants having a fixed, bubble-type, canopy. This revised datum life is to be compared with the total of all cabin pressurizations. That is those recorded on the marker Form 725 issued following the refurbishing assessment (See para. 9) and the combined totals of the Form 725 recorded events when 15,000 feet and 25,000 feet are reached, plus any ground pressurizations.

Form 725 records events when 15,000 ft and 25,000 ft are reached, plus any ground pressurizations, all events being counted as full pressurizations.

### Components limiting aircraft service life

**18.** A number of components exist on the aircraft which require replacing or reconditioning after a pre-established period. These are listed in AP 101B-0400-5A1, Section 2.

**Fuel tanks**

**19.** In order to conserve fatigue life it is essential to re-fill wing integral fuel tanks at the commencement of every sortie except when carrying out flight trim checks in accordance with AP 101B-0407-1A, Sect.3, Chapter 4, Appendix 1., and to observe, strictly, the fuel drills laid down in AP 101B-0407/0415-15, Part 1, Chapter 2, paragraph 22 wherein the fuel in these tanks, except for take-off and climb, is listed to be used last.

**20.** Extended periods of flying with wing-tip tanks empty at take-off may cause an increase in fatigue damage which is not covered by existing formulae. When it is anticipated that such sorties will be flown over long periods, the tip-tanks should be removed.

**Fatigue monitoring**

**21.** The PR Mk.7 aircraft is fitted with a Mk.16 type fatigue meter which records and visibly displays in the appropriate window, the number of times that each of eight different threshold levels of acceleration are reached or exceeded. The letter suffixes by which these 'g' levels are identified are as follows:-

| A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|
| 0.1g | 0.5g | 1.5g | 1.9g | 2.5g | 3.5g | 4.5g | 5.1g |

**22.** The fatigue meter is located in the starboard main undercarriage bay attached to the slant diaphragm. It must be noted that revised fatigue formulae will be required if any type of fatigue meter other than a Mk.16 is fitted.

**Fatigue meter formulae (PR Mk.7 aircraft)**

**23.** The formula for a PR Mk.7 aircraft fitted with a Mk.16 fatigue meter is as follows:-

**Note. . .**

*This formula is only applicable for RAF PR Mk.7 aircraft as detailed in FLA/CAN/4 Iss 2 of 16.8.88, Stress Office, BAe (Military Aircraft) Ltd., Warton, Lancashire, PR4 1AX.*

**METERED FLYING**

**For aircraft without tip-tanks fitted:-**

$$\mathbf{FI} = K_1 \frac{[8.63(A)+0.65(B)+0.012(C)+0.35(D)+5.78(E)+35.41(F)+89.55(G)+145.16(H)] + K_2(LF)+0.22(LR)}{1000}$$

If wing tip pods are fitted, replace $K_1$ with $K_5$ and $K_2$ with $K_6$.

**For aircraft with tip tanks fitted:-**

$$\mathbf{FI} = K_3 \frac{[13.7(A)+1.25(B)+0.021(C)+0.66(D)+10.04(E)+53.08(F)+128.98(G)+205.32(H)] + K_4(LF)+0.46(LR)}{1000}$$

◀ where A - H represents the total counts recorded by the windows marked as follows:-

| WINDOW | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| g | 0.1 | 0.5 | 1.5 | 1.9 | 2.5 | 3.5 | 4.5 | 5.1 |

LF is the number of full stop or braked landings.

LR is the number of roller landings.

Note. . .

*LF and LR will be the totals of each form of landing recorded over the same period as the meter count sample.*

The factors K1 to K6 are given in Tables 1 to 6.

## UNMETERED FLYING

For periods when a fatigue meter is not fitted or is faulty, the fatigue index is to be calculated as follows:-

FI = Flying hours x 1.5 x average FI rate for the relevant configuration. ▶

## TABLE 1

G + M coefficient $K_1$ for PR.Mk.7 without tip tanks fitted

SHUT-DOWN MASS (pounds)

| START-UP MASS (pounds) | 28500-29499 | 29500-30499 | 30500-31499 | 31500-32499 | 32500-33499 | 33500-34499 | 34500-35499 | 35500-36499 | 36500-37499 | 37500-38499 | 38500-39499 | 39500-40499 | 40500-41499 | 41500-42499 | 42500-43499 | 43500-44499 | 44500-45499 | 45500-46499 | 46500-47499 | 47500-48499 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 47500-48499 | 1.00 | 1.03 | 1.06 | 1.09 | 1.11 | 1.13 | 1.15 | 1.18 | 1.21 | 1.24 | 1.32 | 1.43 | 1.55 | 1.68 | 1.84 | 2.01 | 2.19 | 2.37 | 2.55 | - |
| 46500-47499 | 0.89 | 0.92 | 0.95 | 0.97 | 0.99 | 1.02 | 1.05 | 1.10 | 1.13 | 1.17 | 1.22 | 1.28 | 1.39 | 1.52 | 1.67 | 1.84 | 2.00 | 2.18 | - | |
| 45500-46499 | 0.80 | 0.82 | 0.84 | 0.86 | 0.88 | 0.89 | 0.92 | 0.96 | 1.01 | 1.09 | 1.14 | 1.20 | 1.25 | 1.36 | 1.51 | 1.67 | 1.83 | - | | |
| 44500-45499 | 0.72 | 0.74 | 0.76 | 0.77 | 0.78 | 0.79 | 0.81 | 0.83 | 0.88 | 0.94 | 1.03 | 1.12 | 1.18 | 1.24 | 1.36 | 1.52 | - | | | |
| 43500-44499 | 0.66 | 0.67 | 0.69 | 0.69 | 0.69 | 0.70 | 0.71 | 0.72 | 0.76 | 0.81 | 0.89 | 0.98 | 1.08 | 1.16 | 1.23 | - | | | | |
| 42500-43499 | 0.61 | 0.62 | 0.63 | 0.63 | 0.63 | 0.62 | 0.63 | 0.64 | 0.66 | 0.70 | 0.77 | 0.85 | 0.94 | 1.04 | - | | | | | |
| 41500-42499 | 0.58 | 0.59 | 0.60 | 0.59 | 0.59 | 0.58 | 0.57 | 0.57 | 0.59 | 0.62 | 0.68 | 0.75 | 0.83 | - | | | | | | |
| 40500-41499 | 0.56 | 0.57 | 0.57 | 0.57 | 0.56 | 0.54 | 0.53 | 0.52 | 0.53 | 0.55 | 0.61 | 0.67 | - | | | | | | | |
| 39500-40499 | 0.55 | 0.56 | 0.56 | 0.56 | 0.54 | 0.52 | 0.50 | 0.49 | 0.48 | 0.50 | 0.54 | - | | | | | | | | |
| 38500-39499 | 0.55 | 0.56 | 0.57 | 0.56 | 0.54 | 0.51 | 0.49 | 0.47 | 0.45 | 0.45 | - | | | | | | | | | |
| 37500-38499 | 0.56 | 0.57 | 0.58 | 0.58 | 0.56 | 0.53 | 0.50 | 0.48 | 0.45 | - | | | | | | | | | | |
| 36500-37499 | 0.58 | 0.59 | 0.60 | 0.60 | 0.58 | 0.55 | 0.53 | 0.50 | - | | | | | | | | | | | |
| 35500-36499 | 0.59 | 0.61 | 0.62 | 0.63 | 0.61 | 0.58 | 0.55 | - | | | | | | | | | | | | |
| 34500-35499 | 0.59 | 0.62 | 0.64 | 0.65 | 0.64 | 0.61 | - | | | | | | | | | | | | | |
| 33500-34499 | 0.59 | 0.62 | 0.65 | 0.68 | 0.67 | - | | | | | | | | | | | | | | |
| 32500-33499 | 0.57 | 0.61 | 0.65 | 0.68 | - | | | | | | | | | | | | | | | |
| 31500-32499 | 0.53 | 0.57 | 0.61 | - | | | | | | | | | | | | | | | | |
| 30500-31499 | 0.49 | 0.53 | - | | | | | | | | | | | | | | | | | |
| 29500-30499 | 0.46 | - | | | | | | | | | | | | | | | | | | |
| 28500-29499 | - | | | | | | | | | | | | | | | | | | | |

## TABLE 2

G-A-G coefficient $K_2$ for PR.Mk.7 without tip tanks fitted

SHUT-DOWN MASS (pounds)

START-UP MASS (pounds)

| | 28500-29499 | 29500-30499 | 30500-31499 | 31500-32499 | 32500-33499 | 33500-34499 | 34500-35499 | 35500-36499 | 36500-37499 | 37500-38499 | 38500-39499 | 39500-40499 | 40500-41499 | 41500-42499 | 42500-43499 | 43500-44499 | 44500-45499 | 45500-46499 | 46500-47499 | 47500-48499 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 47500-48499 | 10.16 | 10.21 | 10.23 | 10.21 | 10.11 | 9.96 | 10.07 | 10.26 | 10.60 | 10.91 | 10.98 | 10.83 | 10.64 | 10.37 | 9.99 | 9.39 | 8.36 | 6.64 | 3.94 | - |
| 46500-47499 | 9.23 | 9.25 | 9.23 | 9.17 | 9.08 | 8.99 | 9.08 | 9.39 | 9.67 | 9.96 | 9.77 | 9.35 | 9.07 | 8.70 | 8.14 | 7.23 | 5.73 | 3.49 | - | |
| 45500-46499 | 8.44 | 8.42 | 8.37 | 8.26 | 8.10 | 7.94 | 7.81 | 8.03 | 8.43 | 8.88 | 8.73 | 8.20 | 7.50 | 6.91 | 6.11 | 4.91 | 3.03 | - | | |
| 44500-45499 | 7.66 | 7.61 | 7.50 | 7.34 | 7.12 | 6.88 | 6.69 | 6.70 | 7.00 | 7.37 | 7.37 | 6.96 | 6.20 | 5.27 | 4.22 | 2.60 | - | | | |
| 43500-44499 | 6.95 | 6.86 | 6.71 | 6.50 | 6.22 | 5.92 | 5.65 | 5.46 | 5.69 | 6.04 | 5.95 | 5.50 | 4.87 | 3.79 | 2.20 | - | | | | |
| 42500-43499 | 6.41 | 6.29 | 6.11 | 5.85 | 5.51 | 5.16 | 4.87 | 4.61 | 4.66 | 4.87 | 4.67 | 4.10 | 3.26 | 1.96 | - | | | | | |
| 41500-42499 | 6.05 | 5.91 | 5.69 | 5.42 | 5.08 | 4.71 | 4.35 | 4.02 | 3.79 | 3.85 | 3.52 | 2.79 | 1.65 | - | | | | | | |
| 40500-41499 | 5.81 | 5.67 | 5.45 | 5.15 | 4.76 | 4.32 | 3.90 | 3.48 | 3.07 | 2.88 | 2.37 | 1.41 | - | | | | | | | |
| 39500-40499 | 5.71 | 5.55 | 5.30 | 4.96 | 4.50 | 4.00 | 3.49 | 2.97 | 2.43 | 1.92 | 1.22 | - | | | | | | | | |
| 38500-39499 | 5.68 | 5.50 | 5.22 | 4.83 | 4.32 | 3.73 | 3.13 | 2.48 | 1.77 | 1.04 | - | | | | | | | | | |
| 37500-38499 | 5.45 | 5.25 | 4.96 | 4.54 | 3.97 | 3.32 | 2.62 | 1.85 | 1.02 | - | | | | | | | | | | |
| 36500-37499 | 4.81 | 4.61 | 4.31 | 3.88 | 3.29 | 2.59 | 1.82 | 0.99 | - | | | | | | | | | | | |
| 35500-36499 | 4.17 | 3.96 | 3.65 | 3.20 | 2.56 | 1.80 | 0.97 | - | | | | | | | | | | | | |
| 34500-35499 | 3.61 | 3.39 | 3.05 | 2.55 | 1.83 | 0.97 | - | | | | | | | | | | | | | |
| 33500-34499 | 3.00 | 2.75 | 2.36 | 1.78 | 0.97 | - | | | | | | | | | | | | | | |
| 32500-33499 | 2.32 | 2.01 | 1.56 | 0.90 | - | | | | | | | | | | | | | | | |
| 31500-32499 | 1.75 | 1.36 | 0.80 | - | | | | | | | | | | | | | | | | |
| 30500-31499 | 1.17 | 0.70 | - | | | | | | | | | | | | | | | | | |
| 29500-30499 | 0.61 | - | | | | | | | | | | | | | | | | | | |
| 28500-29499 | - | | | | | | | | | | | | | | | | | | | |

## TABLE 3

G + M coefficient $K_3$ for PR.Mk.7 with tip tanks fitted

| START-UP MASS (pounds) \ SHUT-DOWN MASS (pounds) | 28500-29499 | 29500-30499 | 30500-31499 | 31500-32499 | 32500-33499 | 33500-34499 | 34500-35499 | 35500-36499 | 36500-37499 | 37500-38499 | 38500-39499 | 39500-40499 | 40500-41499 | 41500-42499 | 42500-43499 | 43500-44499 | 44500-45499 | 45500-46499 | 46500-47499 | 47500-48499 | 48500-49499 | 49500-50499 | 50500-51499 | 51500-52499 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 51500-52499 | 0.94 | 0.97 | 1.00 | 1.03 | 1.06 | 1.09 | 1.12 | 1.17 | 1.22 | 1.28 | 1.36 | 1.44 | 1.52 | 1.59 | 1.66 | 1.73 | 1.77 | 1.78 | 1.74 | 1.59 | 1.38 | 1.20 | 1.05 | - |
| 50500-51499 | 0.94 | 0.97 | 1.00 | 1.03 | 1.06 | 1.09 | 1.13 | 1.18 | 1.23 | 1.30 | 1.38 | 1.47 | 1.56 | 1.66 | 1.74 | 1.83 | 1.90 | 1.94 | 1.92 | 1.78 | 1.55 | 1.35 | - | |
| 49500-50499 | 0.92 | 0.95 | 0.98 | 1.01 | 1.04 | 1.07 | 1.11 | 1.16 | 1.22 | 1.30 | 1.38 | 1.48 | 1.59 | 1.69 | 1.80 | 1.91 | 2.01 | 2.09 | 2.11 | 2.00 | 1.75 | - | | |
| 48500-49499 | 0.88 | 0.91 | 0.94 | 0.97 | 1.00 | 1.03 | 1.07 | 1.12 | 1.18 | 1.26 | 1.35 | 1.46 | 1.57 | 1.69 | 1.81 | 1.94 | 2.07 | 2.20 | 2.30 | 2.24 | - | | | |
| 47500-48499 | 0.82 | 0.85 | 0.87 | 0.90 | 0.92 | 0.95 | 0.99 | 1.03 | 1.09 | 1.16 | 1.25 | 1.36 | 1.47 | 1.59 | 1.72 | 1.86 | 2.02 | 2.18 | 2.35 | - | | | | |
| 46500-47499 | 0.74 | 0.77 | 0.79 | 0.81 | 0.83 | 0.85 | 0.88 | 0.92 | 0.97 | 1.04 | 1.12 | 1.22 | 1.33 | 1.45 | 1.57 | 1.71 | 1.85 | 2.01 | - | | | | | |
| 45500-46499 | 0.69 | 0.70 | 0.72 | 0.74 | 0.75 | 0.77 | 0.79 | 0.82 | 0.87 | 0.92 | 1.00 | 1.10 | 1.20 | 1.31 | 1.43 | 1.55 | 1.69 | - | | | | | | |
| 44500-45499 | 0.66 | 0.67 | 0.68 | 0.69 | 0.69 | 0.70 | 0.71 | 0.74 | 0.77 | 0.82 | 0.89 | 0.99 | 1.08 | 1.19 | 1.30 | 1.42 | - | | | | | | | |
| 43500-44499 | 0.63 | 0.64 | 0.65 | 0.66 | 0.66 | 0.66 | 0.67 | 0.68 | 0.70 | 0.73 | 0.80 | 0.88 | 0.98 | 1.07 | 1.18 | - | | | | | | | | |
| 42500-43499 | 0.59 | 0.61 | 0.62 | 0.63 | 0.63 | 0.63 | 0.63 | 0.64 | 0.66 | 0.68 | 0.71 | 0.79 | 0.88 | 0.97 | - | | | | | | | | | |
| 41500-42499 | 0.55 | 0.57 | 0.58 | 0.59 | 0.58 | 0.58 | 0.58 | 0.59 | 0.61 | 0.63 | 0.66 | 0.70 | 0.79 | - | | | | | | | | | | |
| 40500-41499 | 0.52 | 0.54 | 0.55 | 0.55 | 0.54 | 0.53 | 0.52 | 0.52 | 0.53 | 0.55 | 0.60 | 0.66 | - | | | | | | | | | | | |
| 39500-40499 | 0.51 | 0.52 | 0.53 | 0.53 | 0.52 | 0.50 | 0.49 | 0.48 | 0.47 | 0.48 | 0.52 | - | | | | | | | | | | | | |
| 38500-39499 | 0.51 | 0.52 | 0.53 | 0.53 | 0.52 | 0.50 | 0.48 | 0.47 | 0.45 | 0.45 | - | | | | | | | | | | | | | |
| 37500-38499 | 0.52 | 0.53 | 0.54 | 0.55 | 0.54 | 0.51 | 0.49 | 0.48 | 0.46 | - | | | | | | | | | | | | | | |
| 36500-37499 | 0.52 | 0.54 | 0.56 | 0.57 | 0.56 | 0.53 | 0.51 | 0.49 | - | | | | | | | | | | | | | | | |
| 35500-36499 | 0.53 | 0.55 | 0.57 | 0.59 | 0.58 | 0.55 | 0.53 | - | | | | | | | | | | | | | | | | |
| 34500-35499 | 0.53 | 0.55 | 0.58 | 0.60 | 0.60 | 0.57 | - | | | | | | | | | | | | | | | | | |
| 33500-34499 | 0.52 | 0.55 | 0.59 | 0.62 | 0.62 | - | | | | | | | | | | | | | | | | | | |
| 32500-33499 | 0.49 | 0.52 | 0.56 | 0.61 | - | | | | | | | | | | | | | | | | | | | |
| 31500-32499 | 0.45 | 0.48 | 0.52 | - | | | | | | | | | | | | | | | | | | | | |
| 30500-31499 | 0.42 | 0.45 | - | | | | | | | | | | | | | | | | | | | | | |
| 29500-30499 | 0.38 | - | | | | | | | | | | | | | | | | | | | | | | |
| 28500-29499 | - | | | | | | | | | | | | | | | | | | | | | | | |

## TABLE 4

G-A-G coefficient $K_4$ for PR.Mk.7 with tip tanks fitted

SHUT-DOWN MASS (pounds)

| START-UP MASS (pounds) | 28500-29499 | 29500-30499 | 30500-31499 | 31500-32499 | 32500-33499 | 33500-34499 | 34500-35499 | 35500-36499 | 36500-37499 | 37500-38499 | 38500-39499 | 39500-40499 | 40500-41499 | 41500-42499 | 42500-43499 | 43500-44499 | 44500-45499 | 45500-46499 | 46500-47499 | 47500-48499 | 48500-49499 | 49500-50499 | 50500-51499 | 51500-52499 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 51500-52499 | 20.51 | 20.63 | 20.73 | 20.80 | 20.84 | 20.87 | 20.95 | 21.06 | 21.22 | 21.42 | 21.67 | 21.90 | 22.04 | 22.04 | 21.88 | 21.53 | 20.91 | 19.91 | 18.29 | 15.64 | 12.41 | 9.28 | 5.49 | - |
| 50500-51499 | 19.30 | 19.42 | 19.52 | 19.59 | 19.62 | 19.65 | 19.73 | 19.85 | 20.01 | 20.22 | 20.47 | 20.71 | 20.86 | 20.87 | 20.73 | 20.38 | 19.72 | 18.59 | 16.75 | 13.70 | 9.95 | 5.90 | - | |
| 49500-50499 | 17.67 | 17.79 | 17.88 | 17.94 | 17.97 | 17.98 | 18.05 | 18.16 | 18.32 | 18.54 | 18.80 | 19.06 | 19.21 | 19.21 | 19.03 | 18.61 | 17.85 | 16.54 | 14.39 | 10.81 | 6.13 | - | | |
| 48500-49499 | 15.63 | 15.73 | 15.81 | 15.85 | 15.84 | 15.83 | 15.87 | 15.96 | 16.21 | 17.01 | 17.51 | 17.50 | 17.37 | 17.06 | 16.64 | 16.12 | 15.19 | 13.64 | 11.05 | 6.38 | - | | | |
| 47500-48499 | 13.43 | 13.50 | 13.54 | 13.54 | 13.50 | 13.44 | 13.59 | 14.06 | 14.74 | 15.48 | 15.94 | 15.87 | 15.67 | 15.26 | 14.61 | 13.62 | 12.16 | 9.98 | 5.98 | - | | | | |
| 46500-47499 | 12.32 | 12.34 | 12.34 | 12.29 | 12.18 | 12.06 | 12.02 | 12.40 | 12.97 | 13.60 | 13.97 | 13.83 | 13.51 | 12.95 | 12.09 | 10.79 | 8.76 | 5.22 | - | | | | | |
| 45500-46499 | 11.54 | 11.40 | 11.33 | 11.22 | 11.06 | 10.88 | 10.73 | 10.88 | 11.33 | 11.82 | 12.07 | 11.82 | 11.38 | 10.63 | 9.49 | 7.62 | 4.57 | - | | | | | | |
| 44500-45499 | 11.05 | 10.90 | 10.71 | 10.48 | 10.19 | 9.88 | 9.61 | 9.51 | 9.80 | 10.14 | 10.25 | 9.89 | 9.30 | 8.27 | 6.58 | 4.03 | - | | | | | | | |
| 43500-44499 | 10.62 | 10.45 | 10.25 | 9.99 | 9.66 | 9.29 | 8.93 | 8.54 | 8.46 | 8.57 | 8.52 | 7.99 | 7.12 | 5.77 | 3.54 | - | | | | | | | | |
| 42500-43499 | 10.06 | 9.97 | 9.76 | 9.46 | 9.08 | 8.66 | 8.21 | 7.74 | 7.37 | 7.26 | 6.92 | 6.19 | 5.05 | 3.09 | - | | | | | | | | | |
| 41500-42499 | 9.42 | 9.29 | 9.09 | 8.78 | 8.32 | 7.77 | 7.24 | 6.70 | 6.21 | 6.09 | 5.56 | 4.32 | 2.67 | - | | | | | | | | | | |
| 40500-41499 | 8.91 | 8.75 | 8.49 | 8.11 | 7.54 | 6.87 | 6.29 | 5.69 | 5.07 | 4.59 | 3.94 | 2.34 | - | | | | | | | | | | | |
| 39500-40499 | 8.56 | 8.36 | 8.06 | 7.61 | 7.00 | 6.32 | 5.61 | 4.85 | 4.03 | 3.09 | 1.94 | - | | | | | | | | | | | | |
| 38500-39499 | 8.37 | 8.14 | 7.80 | 7.36 | 6.72 | 5.92 | 5.08 | 4.14 | 3.06 | 1.72 | - | | | | | | | | | | | | | |
| 37500-38499 | 7.86 | 7.60 | 7.24 | 6.76 | 6.04 | 5.15 | 4.17 | 3.05 | 1.66 | - | | | | | | | | | | | | | | |
| 36500-37499 | 7.06 | 6.78 | 6.37 | 5.83 | 5.05 | 4.07 | 2.95 | 1.58 | - | | | | | | | | | | | | | | | |
| 35500-36499 | 6.17 | 5.86 | 5.42 | 4.84 | 3.98 | 2.86 | 1.51 | - | | | | | | | | | | | | | | | | |
| 34500-35499 | 5.31 | 4.97 | 4.51 | 3.86 | 2.87 | 1.50 | - | | | | | | | | | | | | | | | | | |
| 33500-34499 | 4.38 | 4.02 | 3.52 | 2.75 | 1.50 | - | | | | | | | | | | | | | | | | | | |
| 32500-33499 | 3.43 | 3.00 | 2.34 | 1.35 | - | | | | | | | | | | | | | | | | | | | |
| 31500-32499 | 2.58 | 2.01 | 1.15 | - | | | | | | | | | | | | | | | | | | | | |
| 30500-31499 | 1.72 | 1.00 | - | | | | | | | | | | | | | | | | | | | | | |
| 29500-30499 | 0.87 | - | | | | | | | | | | | | | | | | | | | | | | |
| 28500-29499 | - | | | | | | | | | | | | | | | | | | | | | | | |

## TABLE 5

G + M coefficient $K_5$ for PR.Mk.7 with wing tip pods fitted

SHUT-DOWN MASS (pounds)

| START-UP MASS (pounds) | 29500-30499 | 30500-31499 | 31500-32499 | 32500-33499 | 33500-34499 | 34500-35499 | 35500-36499 | 36500-37499 | 37500-38499 | 38500-39499 | 39500-40499 | 40500-41499 | 41500-42499 | 42500-43499 | 43500-44499 | 44500-45499 | 45500-46499 | 46500-47499 | 47500-48499 | 48500-49499 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 48500-49499 | 1.30 | 1.35 | 1.39 | 1.43 | 1.47 | 1.52 | 1.58 | 1.66 | 1.76 | 1.89 | 2.04 | 2.21 | 2.41 | 2.62 | 2.83 | 3.06 | 3.32 | 3.59 | 3.85 | - |
| 47500-48499 | 1.22 | 1.24 | 1.26 | 1.29 | 1.32 | 1.36 | 1.41 | 1.48 | 1.57 | 1.68 | 1.82 | 1.99 | 2.18 | 2.37 | 2.58 | 2.81 | 3.05 | 3.32 | - | |
| 46500-47499 | 1.16 | 1.18 | 1.19 | 1.21 | 1.22 | 1.24 | 1.26 | 1.32 | 1.39 | 1.49 | 1.62 | 1.78 | 1.96 | 2.15 | 2.34 | 2.55 | 2.78 | - | | |
| 45500-46499 | 1.09 | 1.11 | 1.13 | 1.14 | 1.15 | 1.17 | 1.19 | 1.21 | 1.25 | 1.33 | 1.44 | 1.59 | 1.76 | 1.94 | 2.12 | 2.32 | - | | | |
| 44500-45499 | 0.98 | 1.01 | 1.04 | 1.06 | 1.07 | 1.09 | 1.11 | 1.14 | 1.17 | 1.22 | 1.28 | 1.42 | 1.58 | 1.75 | 1.92 | - | | | | |
| 43500-44499 | 0.90 | 0.92 | 0.94 | 0.95 | 0.96 | 0.97 | 0.98 | 1.02 | 1.07 | 1.13 | 1.19 | 1.26 | 1.41 | 1.58 | - | | | | | |
| 42500-43499 | 0.83 | 0.85 | 0.86 | 0.87 | 0.86 | 0.86 | 0.87 | 0.89 | 0.92 | 0.99 | 1.10 | 1.17 | 1.25 | - | | | | | | |
| 41500-42499 | 0.78 | 0.80 | 0.81 | 0.81 | 0.80 | 0.78 | 0.78 | 0.78 | 0.80 | 0.86 | 0.95 | 1.06 | - | | | | | | | |
| 40500-41499 | 0.75 | 0.77 | 0.78 | 0.77 | 0.76 | 0.74 | 0.72 | 0.71 | 0.72 | 0.75 | 0.83 | - | | | | | | | | |
| 39500-40499 | 0.75 | 0.76 | 0.77 | 0.77 | 0.75 | 0.72 | 0.70 | 0.68 | 0.66 | 0.68 | - | | | | | | | | | |
| 38500-39499 | 0.75 | 0.77 | 0.79 | 0.78 | 0.76 | 0.73 | 0.70 | 0.67 | 0.65 | - | | | | | | | | | | |
| 37500-38499 | 0.77 | 0.79 | 0.81 | 0.81 | 0.79 | 0.76 | 0.73 | 0.70 | - | | | | | | | | | | | |
| 36500-37499 | 0.78 | 0.81 | 0.83 | 0.84 | 0.82 | 0.79 | 0.76 | - | | | | | | | | | | | | |
| 35500-36499 | 0.78 | 0.82 | 0.85 | 0.86 | 0.85 | 0.82 | - | | | | | | | | | | | | | |
| 34500-35499 | 0.77 | 0.82 | 0.86 | 0.89 | 0.88 | - | | | | | | | | | | | | | | |
| 33500-34499 | 0.75 | 0.80 | 0.85 | 0.89 | - | | | | | | | | | | | | | | | |
| 32500-33499 | 0.70 | 0.75 | 0.81 | - | | | | | | | | | | | | | | | | |
| 31500-32499 | 0.64 | 0.70 | - | | | | | | | | | | | | | | | | | |
| 30500-31499 | 0.59 | - | | | | | | | | | | | | | | | | | | |
| 29500-30499 | - | | | | | | | | | | | | | | | | | | | |

## TABLE 6

G-A-G coefficient $K_6$ for PR.Mk.7 with wing tip pods fitted

SHUT-DOWN MASS (pounds)

| START-UP MASS (pounds) | 29500-30499 | 30500-31499 | 31500-32499 | 32500-33499 | 33500-34499 | 34500-35499 | 35500-36499 | 36500-37499 | 37500-38499 | 38500-39499 | 39500-40499 | 40500-41499 | 41500-42400 | 42500-43499 | 43500-44499 | 44500-45499 | 45500-46499 | 46500-47499 | 47500-48499 | 48500-49499 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 48500-49499 | 13.34 | 13.40 | 13.43 | 13.43 | 13.41 | 13.40 | 13.96 | 14.62 | 15.33 | 16.10 | 16.26 | 16.21 | 16.08 | 15.75 | 15.14 | 14.20 | 12.76 | 10.50 | 6.47 | - |
| 47500-48499 | 12.51 | 12.39 | 12.25 | 12.20 | 12.12 | 12.05 | 12.39 | 12.95 | 13.56 | 14.24 | 14.32 | 14.18 | 13.94 | 13.45 | 12.63 | 11.35 | 9.35 | 5.80 | - | |
| 46500-47499 | 12.01 | 11.89 | 11.74 | 11.54 | 11.31 | 11.07 | 10.98 | 11.41 | 11.89 | 12.43 | 12.41 | 12.17 | 11.78 | 11.11 | 9.98 | 8.18 | 5.15 | - | | |
| 45500-46499 | 11.44 | 11.36 | 11.19 | 10.97 | 10.71 | 10.43 | 10.15 | 10.23 | 10.37 | 10.71 | 10.57 | 10.20 | 9.66 | 8.73 | 7.14 | 4.56 | - | | | |
| 44500-45499 | 10.56 | 10.51 | 10.40 | 10.21 | 9.95 | 9.68 | 9.38 | 9.21 | 9.28 | 9.30 | 8.87 | 8.36 | 7.60 | 6.31 | 4.01 | - | | | | |
| 43500-44499 | 9.77 | 9.68 | 9.52 | 9.26 | 8.93 | 8.58 | 8.24 | 7.93 | 8.05 | 8.21 | 7.60 | 6.60 | 5.48 | 3.51 | - | | | | | |
| 42500-43499 | 9.10 | 8.96 | 8.75 | 8.43 | 8.01 | 7.54 | 7.14 | 6.75 | 6.60 | 6.71 | 6.16 | 4.88 | 2.96 | - | | | | | | |
| 41500-42499 | 8.58 | 8.41 | 8.14 | 7.78 | 7.33 | 6.83 | 6.31 | 5.78 | 5.24 | 5.09 | 4.23 | 2.65 | - | | | | | | | |
| 40500-41499 | 8.26 | 8.09 | 7.82 | 7.42 | 6.88 | 6.27 | 5.62 | 4.93 | 4.18 | 3.52 | 2.20 | - | | | | | | | | |
| 39500-40499 | 8.14 | 7.93 | 7.62 | 7.16 | 6.53 | 5.81 | 5.02 | 4.14 | 3.09 | 1.86 | - | | | | | | | | | |
| 38500-39499 | 7.94 | 7.71 | 7.36 | 6.84 | 6.12 | 5.28 | 4.33 | 3.18 | 1.79 | - | | | | | | | | | | |
| 37500-38499 | 7.15 | 6.90 | 6.52 | 5.95 | 5.16 | 4.22 | 3.12 | 1.72 | - | | | | | | | | | | | |
| 36500-37499 | 6.30 | 6.03 | 5.61 | 4.98 | 4.11 | 3.02 | 1.65 | - | | | | | | | | | | | | |
| 35500-36499 | 5.39 | 5.08 | 4.62 | 3.92 | 2.92 | 1.58 | - | | | | | | | | | | | | | |
| 34500-35499 | 4.43 | 4.09 | 3.56 | 2.75 | 1.52 | - | | | | | | | | | | | | | | |
| 33500-34499 | 3.52 | 3.11 | 2.45 | 1.42 | - | | | | | | | | | | | | | | | |
| 32500-33499 | 2.69 | 2.12 | 1.25 | - | | | | | | | | | | | | | | | | |
| 31500-32499 | 1.82 | 1.08 | - | | | | | | | | | | | | | | | | | |
| 30500-31499 | 0.94 | - | | | | | | | | | | | | | | | | | | |
| 29500-30499 | - | | | | | | | | | | | | | | | | | | | |

# Chapter 4 GENERAL SERVICING

*(completely revised)*

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## LIST OF TABLES



## LIST OF ILLUSTRATIONS

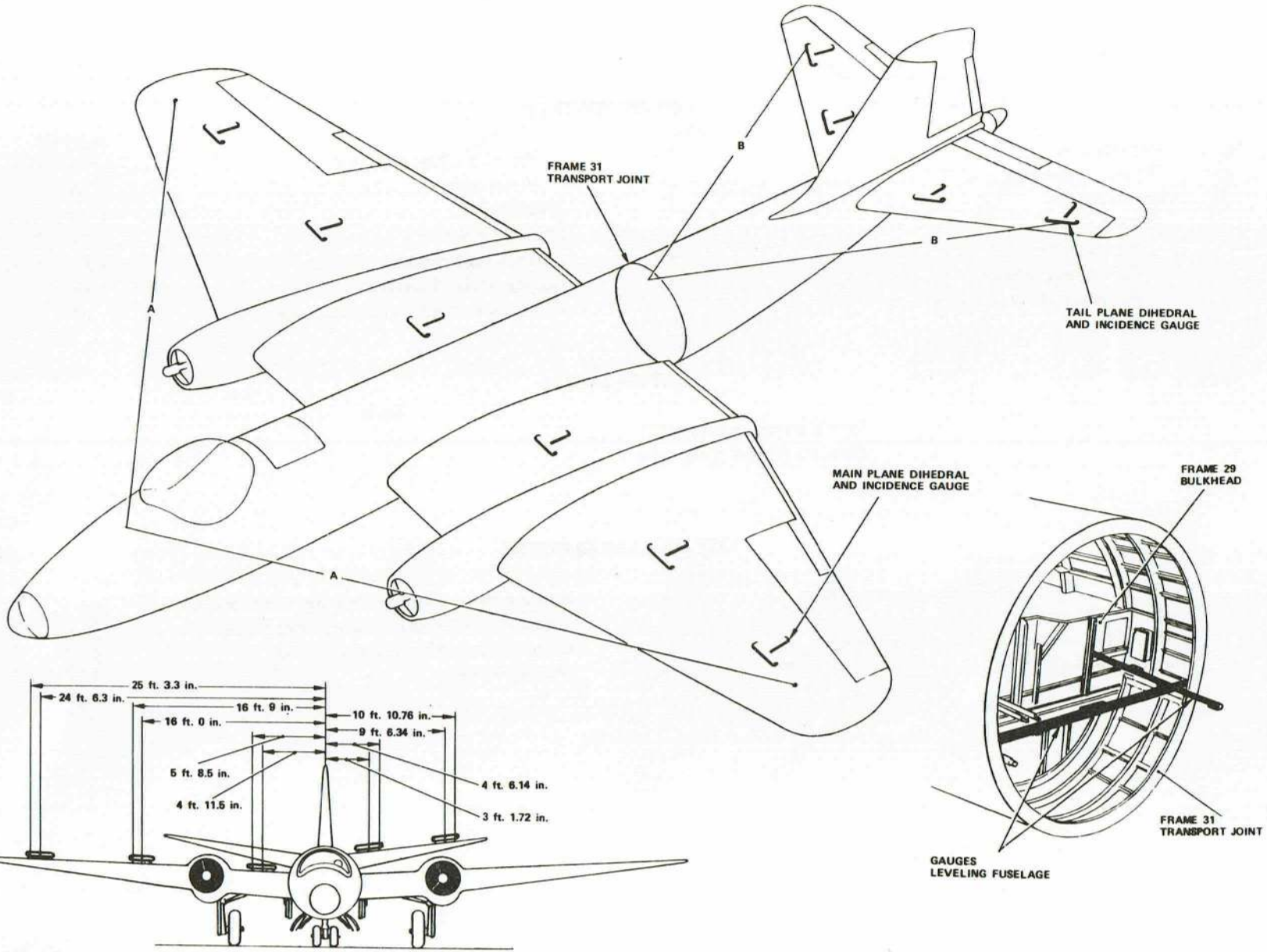


FIG. I. ALIGNMENT CHECKS AND RIGGING GAUGE POSITIONS

**WARNING**

**The relevant safety precautions detailed on the LETHAL WARNING marker card must always be observed before entering the cabin or performing any operations upon the aircraft.**

**Introduction**

**1.** This chapter contains information on the general servicing of the complete aircraft: servicing of the individual components and systems is given in the appropriate chapters of Sections 3 and 4 of this volume.

**Ground equipment**

**2.** The items of ground equipment provided for handling and servicing the aircraft are listed at the end of this chapter. The items are arranged in two tables, Table 1 - Special Ground Equipment (handling and servicing equipment peculiar to this aircraft), and Table 2 - Standard Ground Equipment. These tables contain no items that are normally included in the relevant Appendix A, nor standard equipment normally provided for purposes not confined to aircraft servicing.

**Access panels**

◀ **WARNING**

**The closing panels (Post STI/CAN/583B) must only be removed for access to the engine mounting bracket attachment fasteners. Each bolt securing the panels must be identified during removal of the panels to ensure correct relocation on reassembly of panels.** ▶

**3.** Removable access panels and inspection doors are provided throughout the structure, for access to the controls, services etc., the positions are illustrated in fig.4 and 5. Certain panels are secured by screws having concave slots in their heads and a specially ground screwdriver, having a convex blade, must be used to remove and insert these screws, these panels are indicated on the illustrations. When securing the panels, ensure that in all cases the correct type of screw is used, as in certain comparatively thin skin areas 120 deg countersunk-headed screws are used. To facilitate the inspection of the attachment angles on the fuselage, access apertures and panels are provided between fuselage frames 17 and 18 port and stbd. These access panels are accessible via the main wheel bays.

**Jacking** *(fig.3)*

*Jacking procedure*

**4.** The aircraft may be jacked by positioning one jack under each main plane in line with the engine nacelles and, one on the port side of the fuselage nose. At the main plane positions the jack adapter heads fit into sockets permanently fitted to the main spar, and at the fuselage nose position a removable spigot is screwed into a socket in the structure, below the aft end of the navigator's escape hatch, to which the adapter head of the jack fits. All jacking positions are marked on the aircraft, and illustrated in fig.4 and 5.

**5.** The jacking sequence is as follows:-

(1) Remove the plug from the socket in the front fuselage and fit the nose jacking spigot. Unfasten the hinged panels in the jet pipe cowlings to expose the main plane jacking points.

(2) Place a jack under each main plane jacking point and at the nose jacking spigot; the types of jacks and adapter heads to be used at these points are listed in Table 2 at the end of this chapter.

Note . . .

*The main plane jacks must be positioned with the jack body vertical and with the adjustable legs parallel to the lateral axis of the aircraft. The nose jack must be positioned with the jack body vertical and with the adjustable legs parallel to the longitudinal axis.*

(3) Operate the jacks to raise the aircraft, jacking the main planes slightly in advance of the fuselage nose.

(4) When the aircraft is sufficiently raised, the rear fuselage may be supported, if necessary, at the rear trestling point with a U.J. trestle, No.7, fitted with a former.

Note . . .

*After the aircraft has been lowered to the ground, it should be rocked to allow the shock absorbers to settle.*

*For stores loading*

**6.** The method of jacking the aircraft for loading stores in the flare bay is as follows:-

(1) Ensure that the aircraft is positioned on level ground with a firm foundation.

(2) Position chocks fore and aft of the nose wheel.

(3) Position jacks and adapters (Mk.48) at the main wheel lifting points.

(4) Raise the aircraft to the minimum height required to allow the loaded bomb trolley to be positioned under the flare bay.

*For main-wheel changing*

**7.** The method of jacking for main-wheel changing is as follows:-

(1) Ensure that the aircraft is positioned on level ground with a firm foundation.

(2) Place chocks fore and aft of each wheel.

(3) Place the jack with its adapter head (Mk.27) and main wheel changing bracket in position.

(4) Raise the aircraft just clear of the ground.

*For nose-wheel changing*

**8.** To jack the aircraft for nose-wheel changing:-

(1) Ensure that the aircraft is positioned on level ground with a firm foundation.

(2) Using a spanner remove the plug from the socket in the nose fuselage, and insert and tighten the jacking spigot.

(3) Place chocks fore and aft of the main wheels, and release the brakes.

(4) Place a jack, trestle and adapter (Mk.49) under the nose spigot, and raise until the nose wheels are just clear of the ground.

(5) Support the fuselage at frame 42.

*In the open*

**9.** Fig.3. shows allowable wind velocity against wind angle through the full range of nose-to-wind to tail-to-wind at which the aircraft may be lifted on the main undercarriage pillar jacks for purposes of bomb/flare loading, or unloading, or the main-wheel changing. In applying this graph there are certain precautions which must be observed:-

(1) Aircraft may be at any weight between basic and maximum take-off provided that fuselage fuel is evenly distributed.

(2) Fuelling or defuelling or changes to wing store loading must not be carried out whilst the aircraft is on pillar jacks.

(3) Bomb/flare loading and unloading procedures are to conform with techniques laid down in relevant Air Publications.

(4) Ground slope allowance of 4 degrees is permitted in the fore and aft direction only.

(5) Both main wheels are to be jacked simultaneously.

(6) Ground locks are to be fitted to all flying control surfaces.

(7) The nose-wheel picketing requirement must be applied when necessary *(Sect.2, Chap.1).*

**Trestling** *(fig.2)*

**10.** When trestling the aircraft, or components of the aircraft, the correct type of trestle with appropriate former as specified in Table 1 must be used.

**Drainage holes**

**11.** Drainage holes are provided in various parts of the aircraft skinning, the number of holes and their position is illustrated in fig.7. These holes must always be kept free from obstruction, especially those in the jet pipe cowlings.

(1) A drain plug, in the shape of a large mushroom-headed screw, situated in the fuselage lower skin just forward of the pressure bulkhead and starboard of the keel unit centre line, is provided for periodic draining of the pressure cabin *(fig.7).* When unscrewed, the drain plug is retained suspended below the drain hole by a captive split-pin and no attempt should be made to remove the plug from the aircraft. After draining the cabin, care must be taken before screwing back the drain plug, to ensure that no foreign matter remains on or about the plug rubber seal as this will cause loss of cabin pressure. Two ⅛ in. drain holes are also provided for the canopy coaming tube; these are situated at the lowest points of the tube and are plugged with self-tapping screws rolled in Bostic sealing compound to prevent loss of cabin pressure.

**Order of dismantling**

**12.** The sequence of dismantling an aircraft is given below, detailed information on the removal of individual components is given in the appropriate chapters of Sections 3 and 4 of this volume.

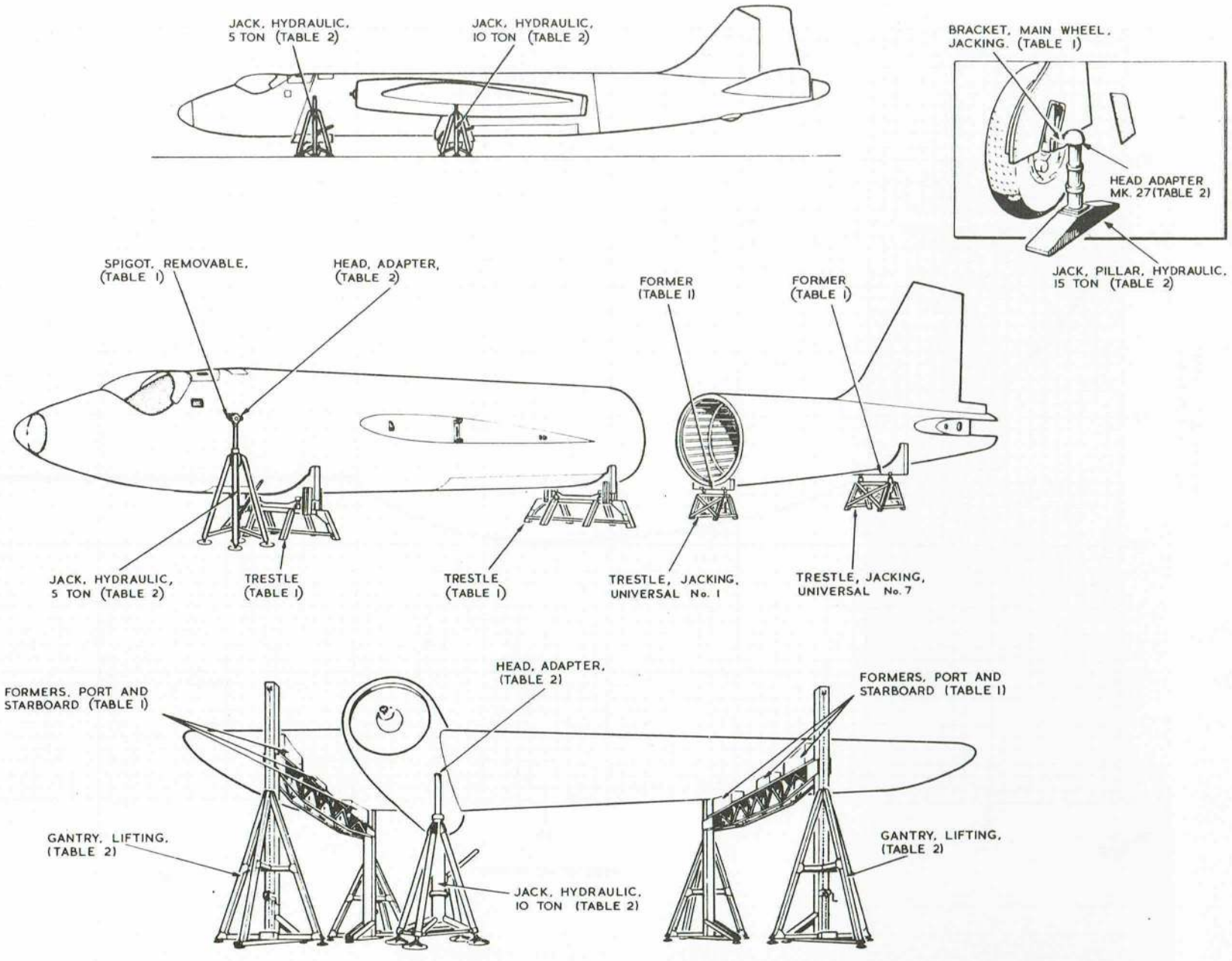


FIG. 2. JACKING AND TRESTLING

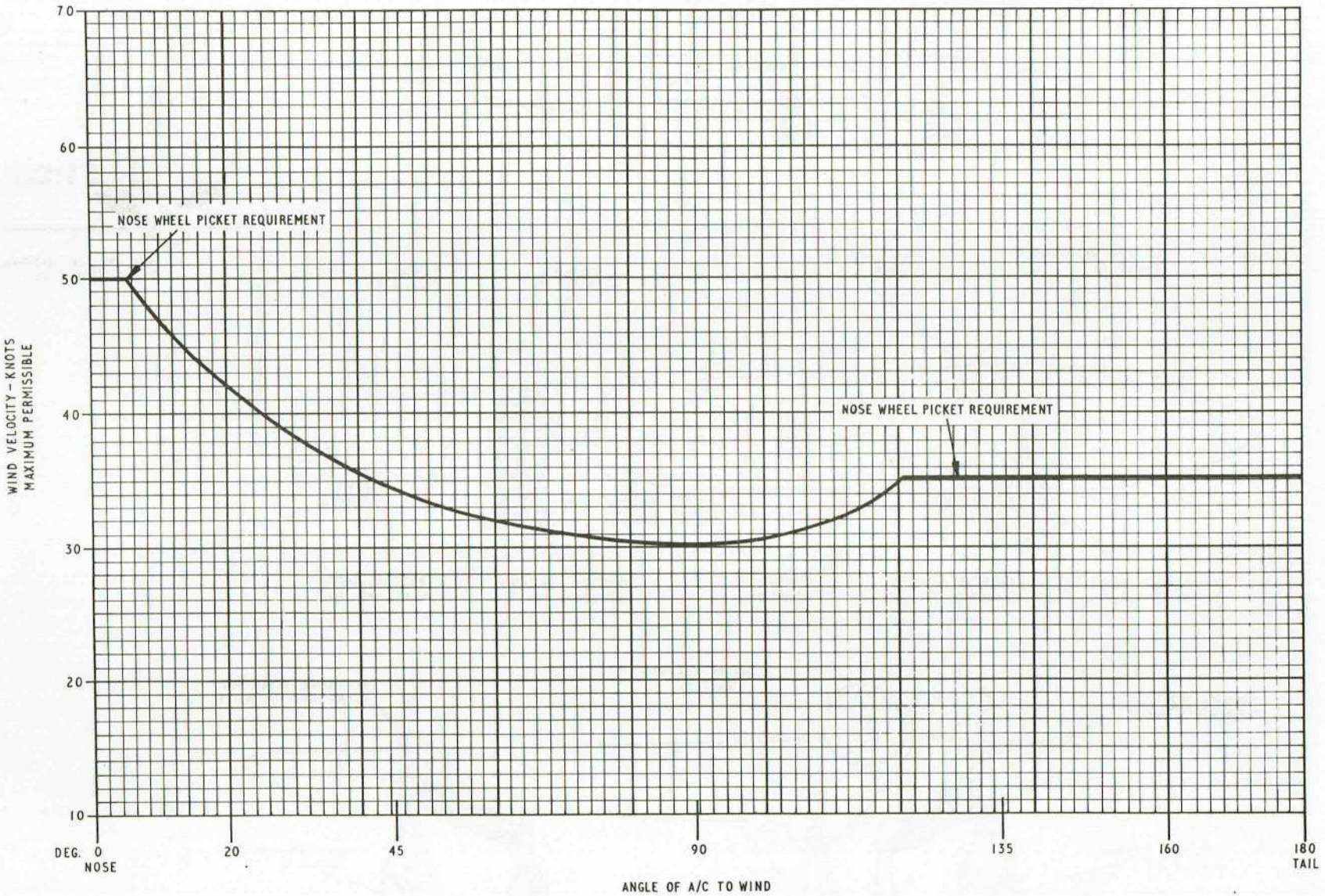


FIG.3. MAXIMUM PERMISSIBLE WIND VELOCITY FOR JACKING IN THE OPEN

◀REDRAWN AND CLARIFIED▶

(1) Remove the engines and jet pipes from the main planes *(Sect.4, Chap.1)*

(2) Remove the tail plane from the rear fuselage *(Sect.3, Chap.3).*

(3) Remove the rudder and fin from the rear fuselage *(Sect.3, Chap.3).*

(4) Remove the rear fuselage from the front fuselage *(Sect.3, Chap.1).*

(5) Remove the main planes from the front fuselage *(Sect.3, Chap.2)*

The sequence of assembly is the reversal of that given for dismantling.

**Rigging of fixed surfaces**

**13.** The main plane, tail plane and fin are fixed cantilever structures which are rigged when correctly assembled to the fuselage; adjustment is, therefore, impossible. The symmetry of the aircraft and the incidence and dihedral of the planes should be checked, however, in the manner indicated in the following paragraphs, after the aircraft has been rigged or whenever it is necessary to verify that the components are true. The location points for the incidence and dihedral gauges are marked on the upper surfaces of the main and tail planes, on the centre-line of the main spar booms; their positions outboard of the centre-line of the fuselage are indicated in fig.1.

**14.** The procedure for checking the alignment and rigging of the aircraft is:-

(1) Jack the aircraft *(para.4 and 5).*

(2) Place the lateral leveling gauge on the port and starboard leveling brackets at frame 31 *(fig.1)*; the port and starboard ends are indicated on the gauge. Using a clinometer on the gauge, level the aircraft laterally (0 deg ± 0 min).

(3) With the lateral gauge in position, place the longitudinal gauge on the leveling bracket on the starboard side of frame 29 bulkhead and on the datum pad on the lateral gauge *(fig.1).* Using a clinometer on the gauge, level the aircraft longitudinally (0 deg ± 0 min).

(4) Check for symmetry by measuring the diagonals at the following points on both sides of the aircraft:-

(a) From a point 2.46 in. aft of the frame 1 on the upper surface of the fuselage to the datum bolt on the centre-line of the main plane spar at the wing tip *(dimension A, fig.1).* The difference between the port and starboard diagonals must not exceed 1 in.

(b) From a point 1 in. aft of the rear fuselage transport joint to the outboard incidence gauge point on the tail plane, with the tail plane at minimum incidence *(dimension B, fig.1).* The difference between the port and starboard diagonals must not exceed 0.5 in.

(c) From the datum bolt at the wing tip to the outboard incidence gauge point on the tail plane, on both sides. The dimensions should be equal ± 1.0in. with the tail plane at minimum incidence.

(5) Check the main plane incidence and dihedral, using a clinometer, with the gauge positioned at each of the three points shown in fig.1. The dihedral reading should be 2 deg ± 10 min at all points, and the incidence reading 5 deg 50 min ± 15 min at the outboard position (rib 6) of the outer wing, 5 deg 8 min ± 15 min at the inboard position (rib 3) of the outer wing and 4 deg 49 min ± 15 min at the inner wing position (rib 3).

(6) Check the tail plane dihedral with the tail plane at maximum incidence, using a clinometer with gauge positioned at the inboard position, the reading should be 7 deg 57 min ± 15 min.

(7) Check the tail plane incidence at minimum incidence, using a clinometer, with gauge positioned at the starboard inboard position, the reading should be 2 deg 12 min ± 13 min. Set the tail plane at maximum incidence and using a clinometer with the same gauge, check the incidence at the inboard position; this should be 3 deg 59 min ± 13 min. Check the incidence at the outboard position; the reading should be that obtained at the inboard position plus 1 deg 48 min $^{+1\text{ deg }2\text{ min}}_{-50\text{ min}}$.

**Component weights and dimensions**

**15.** The component weights and dimensions are given in the key to fig.6.

## TABLE 1

### Special ground equipment

| Ref. No. | Part No. | Description | Application |
|---|---|---|---|
| | | *Towing and steering equipment* | |
| 26FZ/95022 | EA3.88.15 | Adapter, fork, nose towing | Used with towing arm, 4GB/4409924 |
| 26FZ/95087 | EA3.88.157 | Arm, nose steering | |
| | | *Jacking equipment* | |
| 26FZ/95004 | EA1.88.23 | Spigot, nose jacking | Used in conjunction with hydraulic jacks for front fuselage raising and lowering |
| 26FZ/95413 | EA3.88.307 | Bracket, main wheel changing | Used in conjunction with adapter head, Mk.27 and jack, 15 ton |
| | | *Slinging equipment* | |
| 26FZ/95039 | EA2.88.1 | Sling, nose and mid fuselage | Front fuselage |
| 26FZ/95007 | EA1.88.65 | Sling, fuselage tail | Rear fuselage |
| 26FZ/95008 | ◀EA1-88-919▶ | Sling, main plane | |
| 26FZ/95009 | EA1.88.59 | Sling, tail plane | |
| 26FZ/95084 | EA1.88.601 | Sling, fin and rudder | |
| 26FZ/95443 | EB6.88.39 | Sling | Integral fuel tanks installation |
| 26FZ/95444 | EB6.88.81 | Strap, inner | |
| 26FZ/95445 | EB6.88.83 | Strap, outer | |
| 26FZ/95273 | EA1.88.785 | Sling, complete aircraft | Used together with beam, gantry, Type A (Ref. No.4Q/4230656) and upright, gantry, Type A (Ref. No.4Q/2309) for main plane changing |
| 26FZ/95025 | EA1.88.91A | Former, wing, forward | Rib 4 Port |
| 26FZ/95026 | EA1.88.91B | Former, wing, centre | |
| 26FZ/95027 | EA1.88.91C | Former, wing, aft | |
| 26FZ/95028 | EA1.88.91D | Former, wing, forward | Rib 5 Port |
| 26FZ/95029 | EA1.88.91E | Former, wing, centre | |
| 26FZ/95030 | EA1.88.91F | Former, wing, aft | |
| 26FZ/95031 | EA1.88.92A | Former, wing, forward | Rib 4 Stbd. |
| 26FZ/95032 | EA1.88.92B | Former, wing, centre | |
| 26FZ/95033 | EA1.88.92C | Former, wing, aft | |
| 26FZ/95034 | EA1.88.92D | Former, wing, forward | Rib 5 Stbd. |
| 26FZ/95035 | EA1.88.92E | Former, wing, centre | |
| 26FZ/95036 | EA1.88.92F | Former, wing, aft | |

*continued . . .*

**TABLE 1 Special ground equipment** — *continued*

| Ref. No. | Part No. | Description | Application |
|---|---|---|---|
| | | *Trestling equipment* | |
| 26FZ/95017 | EA1.88.87A | Former, rear fuselage, front | Used with U.J.T. No.1 |
| 26FZ/95018 | EA1.88.87B | Former, rear fuselage, rear | Used with U.J.T. No.7 |
| 26FZ/95037 | EA1.88.417 | Trestle, adjustable, front fuselage, front | |
| 26FZ/95038 | EA1.88.419 | Trestle, adjustable, front fuselage, front | |
| | | *Rigging equipment* | |
| 26FZ/95010 | EA1.88.93 | Gauge, incidence and dihedral, main plane | |
| 26FZ/95115 | EA3.88.179 | Gauge, incidence and dihedral, tail plane | |
| 26FZ/95040 | EA1.88.447 | Gauge, leveling, fuselage | Lateral (cockpit) and longitudinal (centre fuselage) |
| 26FZ/95093 | EA1.88.747 | Gauge, leveling, fuselage | Longitudinal (cockpit) and lateral (rear fuselage) |
| | | *Miscellaneous equipment* | |
| 26FZ/95013 | EA1.88.79 | Bridge-piece, wing | Fitted when engine is removed |
| 26FZ/95412 | GM/C/1776 | Cover, waterproof | Avro triple-carrier |
| 26FZ/95080 | EA1.88.489 | Handle, crutching | Avro triple-carrier |
| 26FZ/95277 | EB7.88.1 | Plate, blanking, air intake | |
| 26FZ/95089 | EA1.88.743 | Sleeve, locking, main undercarriage | |
| 26FZ/95105 | EA1.88.255 | Pin, nose wheel locking | |
| 26FZ/95109 | EA3.88.211 | Cradle, wing-tip fuel-tank | |
| 26FZ/95442 | EB6.88.85 | Cowling, slave, port and starboard | Fitted for engine ground-testing |
| 26FZ/95538 | EB7.88.205 | Guard, safety, engine-nacelle | |
| 26FZ/95270 | EA3.88.281 | Plug, blanking, cabin pressure control-valve | |
| 26FZ/95090 | EA1.88.799 | Strut, jury tail-plane | |
| 26FZ/95083 | EA2.88.35 | Trolley, No.6 fuel-tank | |
| 26FZ/95619 | EA3.88.5053 | Set, testing comprising: | |
| — | EA3.88.5055 | Case, carrying | |
| — | EA3.88.5057 | Test orifice (3) | |
| — | EA3.88.5059 | Blanking plug assembly, pressure reducing valve | For testing air ventilated suit system |
| — | EA3.88.5061 | Blanking plug assembly, water extractor drain | For testing air ventilated suit system |
| — | EA3.88.5063 | Blanking plug assembly, relief valve | For testing air ventilated suit system |
| — | EA3.88.5069 | Test gauge adapter assembly | For testing air ventilated suit system |
| — | EA3.88.5077 | Test gauge adapter assembly | For testing air ventilated suit system |
| — | EA4.40.169 | Ring bolt, picketing/slinging | Main plane and tail plane |

*continued . . .*

**TABLE 1 Special ground equipment** — *continued*

| Ref. No. | Part No. | Description | Application |
|---|---|---|---|
| | | *Tools* | |
| 26FZ/95103 | Messier T.1342/75 | Block, split | Used on dive brakes |
| 26FZ/95044 | EA1.88.375 | Extractor | Tab torque tube lever, aileron and rudder |
| 26FZ/95104 | EA1.88.825 | Extractor | Aileron hinge pins |
| 26FZ/95047 | EA1.88.359 | Extractor | Main plane pick-up pins |
| 26FZ/95462 | EB6.88.103 | Extractor | Rudder spring |
| — | EB6.88.101 | Tool, separating | tab removal |
| 26FZ/95292 | A.6300 | Extractor, wheel | For main undercarriage wheels |
| — | A.10056 | Fixture, brake-alignment | |
| 26FZ/95100 | EA1.88.823 | Gauge | For aileron fixed tab |
| 26FZ/95101 | EA1.88.821 | Tool, setting | |
| 26FZ/95048 | EA1.88.363 | Inserter | Main plane pick-up pins |
| 26FZ/95088 | EA1.88.733 | Inserter | Main undercarriage pivot pin |
| 26FZ/95063 | EA1.88.395 | Key | Hydraulic filler cap |
| 26FZ/95072 | EA1.88.551 | Disc, setting | |
| 26FZ/95293 | EA1.88.831 | Indicator | |
| 26FZ/95074 | EA1.88.549 | Plate, setting, throttle-box | |
| 26FZ/95407 | EB6.88.29 | Plate, setting, port bell-crank lever | For rigging engine-controls |
| 26FZ/95295 | EA1.88.548 | Plate, setting, starboard bell-crank lever | |
| 26FZ/95408 | EB6.88.27 | Disc, settting, layshaft levers, port engine only | |
| 26FZ/95490 | EA1.88.889 | Bolt, slave | |
| 26FZ/95532 | EA1.88.893 | Inspection gauge | Canopy locating |
| 26FZ/95491 | EA1.88.891 | Pin locating | |
| 26FZ/95082 | A/MBEU/70/EE | Rig, resetting | For elevator snatch unit |
| 26FZ/95268 | EA2.88.113 | Spanner, box | For No.6 tank filler pipe |
| 26FZ/95493 | EA1.88.877 | Spanner, release | For nose undercarriage doors |
| 26FZ/95059 | EA1.88.385 | Spanner | For main undercarriage pivot bolt |
| 26FZ/95060 | EA1.88.387 | Spanner | For main undercarriage pivot nut |
| 26FZ/95054 | EA1.88.345 | Spanner | For torque links |
| 26FZ/95046 | EA1.88.379 | Spanner, universal | Aileron centre hinge pin |
| 26FZ/95065 | EA1.88.365 | Spanner | Front fuselage jacking socket plug |
| 26FZ/95264 | A.S.130 | Spanner | Wing tip tank filler cap |
| 26FZ/95064 | EA1.88.263 | Spanner | Wing tip tank drain valve (pre Mod.733) |
| 26FZ/95269 | EA3.88.293 | Spanner | Wing tip tank drain valve (post Mod.733) |
| 26FZ/95079 | EA1.88.531 | Spanner | Wing tip tank explosive bolts |
| 26FZ/95086 | EA3.88.135 | Spanner | Main undercarriage axle clamp |
| 26FZ/95466 | EB7.88.203 | Spanner | Integral tank fuel pump pipe |
| 26FZ/95493 | EA1.88.877 | Spanner | Nose undercarriage up lock |
| 26FZ/95297 | EB7.88.65 | Template, rigging, aileron | |

*continued . . .*

**TABLE 1 Special ground equipment — *continued***

| Ref. No. | Part No. | Description | Application |
|---|---|---|---|
| 26FZ/95297 | EB7.88.65 | Template, rigging, aileron | |
| 26FZ/95296 | EB7.88.55 | Template, rigging, elevator | |
| 26FZ/95265 | EA3.88.247 | Template, rigging, rudder | |
| 26FZ/95015 | EA1.88.255 | Pin, locking, undercarriage nose | |
| 26FZ/95089 | EA1.88.743 | Sleeve, locking main undercarriage | |

**TABLE 2**

**Standard ground equipment**

| Ref.No. | Description | Application |
|---|---|---|
| | *Towing equipment* | |
| 4GB/4409924 | Arm, towing | |
| 4GB/4409987 | Bridle, towing 50 ft. | |
| 28Y/1057116 | Shackle ¾ in. | |
| 28Y/9508299 | Shackle pin | |
| | *Jacking equipment* | |
| 4Q/2533428 | Adapter head, special | |
| 4Q/2141391 | Body, jacking, hydraulic, 15 tonne | Aircraft jacking at main plane |
| 4Q/2121393 | Trestle Mk.2 | |
| 4Q/4230856 | Trolley, transporter | |
| 4Q/4230826 | Adapter head, Mk.49 | |
| 4Q/4230641 | Body, jacking, hydraulic, 5 ton | Aircraft jacking at front fuselage |
| 4Q/4230643 | Trestle, Mk.2 | |
| 4Q/4230661 | Adapter head, Mk.27 | |
| 4Q/1045837 | Jack, pillar, hydraulic, 15 ton | Main undercarriage jacking |
| 4Q/4230862 | Trolley, transporter | |
| | *Trestling equipment* | |
| 4GB | Trestle, U.J. No.1 c/w Type A brackets | Rear fuselage support |
| 4GB | Trestle, U.J. No.7 c/w Type A brackets | |
| | Gantry, lifting, comprising:- | |
| 4Q/2309 | Upright, Type A | For main plane changing |
| 4Q/4230656 | Beam, Type A | |
| | *Engine changing equipment* | |
| 4GC/4232188 | Sling, engine, Avon, universal, Mk.2 | |
| 40B/1030 | Stand, Avon, universal | |
| 40B/1031 | Adapters, stand, Type Avon/1 | Used with 40B/1030 |
| 4G/4858 | Trolley, E.C.U., servicing, Mk.2 | |

*continued . . .*

**TABLE 2 Standard ground equipment** — *continued*

| Ref. No. | Description | Application |
|---|---|---|
| | *Miscellaneous equipment* | |
| 4G/1050581 | Adapter, inflation, Mk.2 | Shock absorber strut charging |
| 4G/4420033 | Gauge, pressure, 0-1500 lb/in$^2$ | |
| 4G/4420034 | Gauge, pressure, 0-3500 lb/in$^2$ | |
| 4G/6087 | Test rig, hydraulic, Mk.3a | Testing automatic cut-out valve |
| 4F/1041044 | Trolley, pressure cabin testing, Mk.1C | Used with adapter, air supply, 4F/1807 |
| 4G/4420233 | Mats, main plane, Type C | |
| 4F/1799 | Trolley, electrical, servicing, Mk.3 | |
| 105G/11 or 5G/559 | Adapter | |
| 4G/5888 | Trolley, high pressure, air charging, Mk.2B | |
| 4F/1715 | Trolley, instrument and autopilot, testing | |
| 4F/1805 | Trolley, low pressure, pneumatic, Mk.1 | |
| 4G/4220 | Trolley, oxygen, charging | |
| 4F/4229181 | Trolley, radar, hoist, servicing, Type B | |
| 4F/4229223 | Trolley, servicing, hydraulic, Mk.2A | |
| 4G/105081 | Adapter, inflation | |
| 4G/4420031 | Pump, oleo, Type F | Shock absorber strut charging |
| | *Tools* | |
| 27G/5105 | Fixture, brake alignment (A.10056) | |
| 1B/4467 | Gun, lubricating, universal | Nose undercarriage strut shock-absorber charging |
| 27Q/14103 | Adapter, flexible, charging | |
| 1A/1943999 | Scale, tubular balance, | Flying controls static friction |
| 1C/1201263 | Wrench, torque, 0-150 lb ft. | Main plane attachment bolts |
| 1L/9106397 | Spanner, socket, ¾in. B.S.F. x ½ in.sq. drive | |
| 1L/9106401 | Spanner, socket, bi-hex. 1 in. B.S.F. x ¾ in. sq. drive | |
| 1L/9106310 | Adapter, ½ in. socket x ¾ in. plug | |
| 27C/5193 | Gauge, friction pad wear, AD.100071 | Main wheel brakes |
| 27G/5249 | Gauge, tennon wear, AD.100070 | |
| 27Y/3564 | Spanner, hook, RS.181/10 | Used on dive brakes |
| 27Y/4933 | Spanner, hook, RS.181/23 | |
| 27Q 5120-99-4674381 | Dowty resetting tool Pt. No. ST 1657. Locally manufactured resetting tool AP113D-1130-1, Chap.1, Fig.3. | For resetting U/C EMERGENCY UP selection |

*continued . . .*

TABLE 2 Standard ground equipment – *continued*

| Ref. No. | Description | Application |
|---|---|---|
| 36DD/6123 | Spanner, E.38371 | Generator cooling muff union |
| 64JJ/144 | Spanner, BL.2441 | |
| 1C/9106211 | Spanner, tubular, box, 5/16 in. x 3/8 in. W x 7½ in. long | Wing tip explosive bolt detonators |
| 5A/3859 | Torches, electric, hand, probe, illuminator | |
| 1C/9106572 | Trammels, steel, 42 in. | Checking tail plane actuator movement |
| 1C/1201352 | Wrench, torque, 5-50 lb in. x ½ in.sq. drive | For explosive bolts, pilot's canopy |
| 1L/9106389 | Socket, 7/16 in. B.S.F. x 3/8 in.sq. drive | |
| 1L/9106303 | Adapter, ½ in.sq. socket x 3/8 in.sq. plug | |
| 1C/9105853 | Screwdriver | Generator cowling duct |
| 1C/9106265 | Spanner, S.E. 1 1/8 in. W | Main fuel feed |
| 1B/1277745 | Level, spirit, 0-10 deg. | Checking tail plane incidence |
| | *Weighing equipment* | |
| 4GB/4399004 | Hydrostatic unit, 25 ton | Main wheel position |
| 4GB/4398891 | Adapter (unit to aircraft pad) | |
| 4GB/4398897 | Adapter (jack to unit) | For use with Ref. No.4GB/4399004 |
| 4Q/1045837 | Jack, 15 ton | |
| 4GB/4399003 | Hydrostatic unit, 10 ton | Nose wheel position |
| 4GB/4398902 | Adapter (unit to nose U/C) | |
| 4GB/4398907 | Adapter (jack to unit) | For use with Ref. No.4GB/4399003 |
| 4Q/1054121 | Jack, 8 ton | |

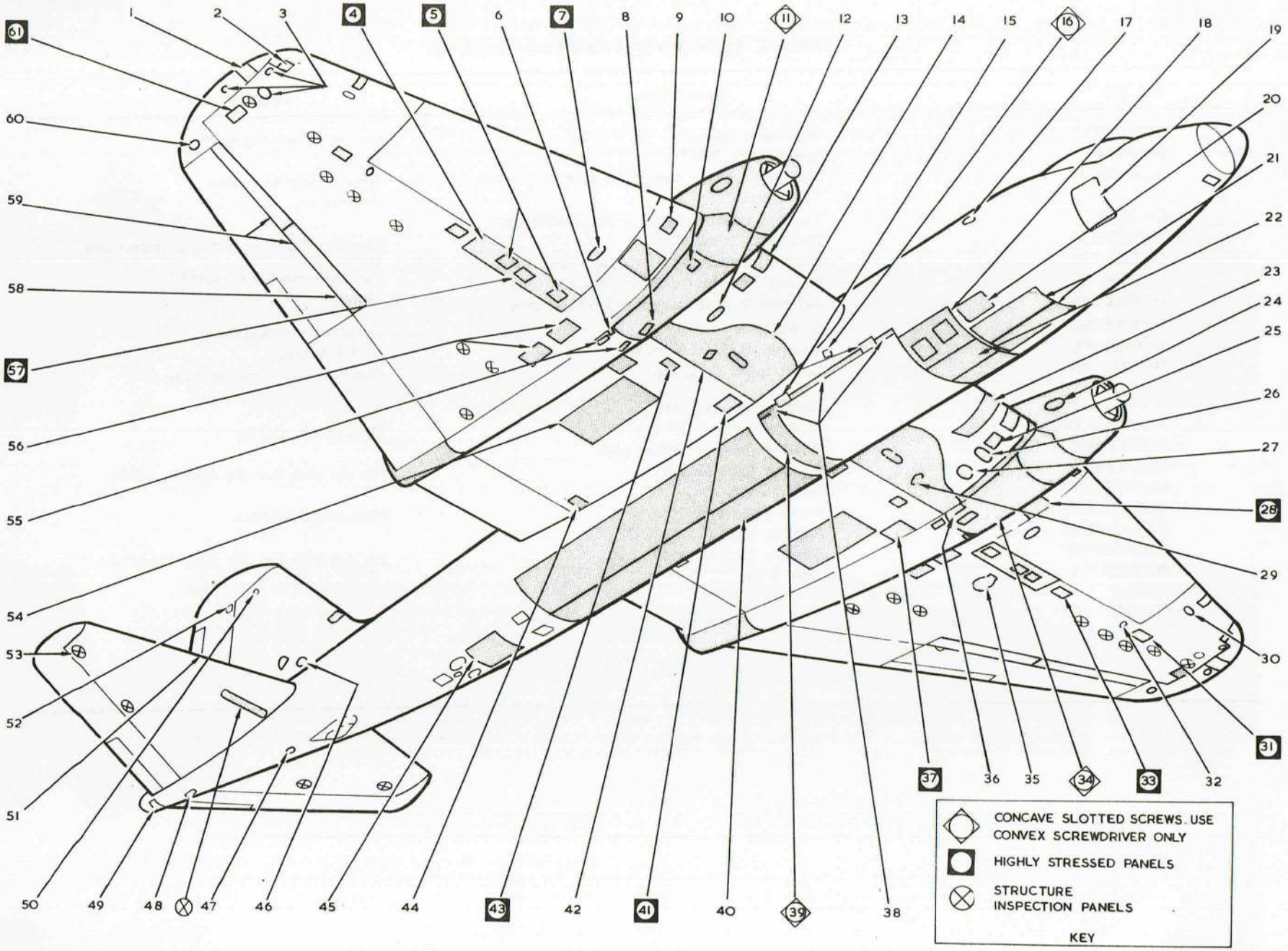


FIG. 4. ACCESS PANELS LOWER SURFACE AND STARBOARD SIDE

◀ ITEMS 24 AND 53 ADDED ▶

## KEY TO FIG.4 (ACCESS PANELS, LOWER SURFACE AND STARBOARD SIDE)

*All panels in the main planes are on both the port and starboard sides, unless otherwise stated*

1 WING-TIP FUEL TANKS AIR AND FUEL PIPES
2 NAVIGATION AND TAXYING LAMPS
3 WING-TIP FUEL TANK EXPLOSIVE ATTACHMENT BOLTS
4 SERVICE PANEL – AIR BRAKES
5 AIR BRAKES MECHANISM
6 JACKING POINT
7 INTEGRAL FUEL TANK COLLECTOR BOX: FUEL PUMP
8 UNDERCARRIAGE COWLING FLAP ACTUATING LINK
9 SERVICE PANEL – RECUPERATOR CONNECTIONS; FUEL PIPE; ZONE 2 AIR INTAKE PIPE CONNECTOR
10 FIRE PANEL
11 SERVICE PANEL – ENGINE HIGH PRESSURE FUEL COCK COUPLING; THROTTLE VALVE COUPLING; OIL SUMP DRAIN; OIL SUMP FILLER CAP; OIL FILTERS; LOW PRESSURE FUEL FILTER AND DRAIN; OIL COOLER PIPES TO SUMP; OIL PRESSURE TRANSMITTER; OIL COOLER; ANTI-ICING PIPE TOGGLE CLAMP
12 ILS MARKER AERIAL (starboard side)
13 HYDRAULIC PUMP
14 MAIN UNDERCARRIAGE DOOR – DOOR JACKS AND SEQUENCE VALVES
15 NO.6 FUEL TANK ATTACHMENTS
16 NO.6 FUEL TANK FILLER CAP
17 HYDRAULIC RESERVOIR FILLER CAP
18 FORWARD CAMERA-BAY WINDOWS
19 MAIN ENTRANCE DOOR
20 MAIN ELECTRICAL PANEL; EXTERNAL ELECTRICAL SUPPLY SOCKET
21 NOSE UNDERCARRIAGE DOORS
22 FORWARD CAMERA BAY – CAMERAS; HYDRAULIC ACCUMULATOR CHARGING VALVE AND GAUGE (WHEEL BRAKES); CAMERA DOOR JACKS; OXYGEN CHARGING VALVE
23 SERVICE PANEL (port side)
◀ 24 P.V. RAM
25 ACCESSORIES GEARBOX DRAIN
26 CONSTANT-FLOW VALVE (port side)
27 AIR MILEAGE UNIT (port side)
28 INTEGRAL FUEL TANK PUMP; FUEL COCKS; FUEL PUMP GLAND DRAIN
29 PICKETING POINT
30 GLIDE PATH AERIAL
31 ELECTRICAL CONNECTIONS
32 PICKETING POINT
33 AILERON CONTROL
34 ENGINE BOTTOM REAR COWLING
35 LANDING LAMP (port side)
36 UNDERCARRIAGE COWLING FLAP
37 MAIN UNDERCARRIAGE PIVOT PIN
38 NO.6 FUEL TANK FAIRING
39 NO.6 FUEL TANK COLLECTOR BOX; FUEL COCKS AND ACTUATORS
40 FLARE BAY DOORS – HYDRAULIC SELECTOR VALVES; HYDRAULIC RELIEF VALVES; NO.5 TANK FUEL COCKS, ACTUATORS AND FUEL PUMPS
41 MAIN SPAR ATTACHMENTS
42 MAIN UNDERCARRIAGE FIXED FAIRING – HYDRAULIC ACCUMULATOR CHARGING VALVE AND GAUGE (starboard side)
43 AILERON CONTROL RODS; FUEL AND HYDRAULIC PIPES
44 MAIN PLANE REAR WALL ATTACHMENT
45 CAMERA AND REAR FUSELAGE HATCH – REAR DATUM BLOCKS; FLYING CONTROL ROD COUPLINGS; PICKETING RING-BOLTS STOWAGE; FIRE EXTINGUISHER BOTTLE; NITROGEN REDUCING VALVE AND VENT VALVE; NO.5 FUEL TANK; ENGINE STARTER CARTRIDGES
46 RUDDER OPERATING LEVER
47 PICKETING POINT
48 DOWNWARD REAR LAMP
49 REAR CONE ATTACHMENTS
50 FIN SLINGING POINT (fabric patch)
51 RUDDER TAB CONTROL TUBE
52 RUDDER SLINGING POINT
53 ELEVATOR HINGE PINS
54 SERVICE PANEL – RADAR/RADIO
55 AILERON CONTROL TUBE COUPLINGS
56 NITROGEN BOTTLES STOWAGE SYSTEM INOPERATIVE
57 FUEL CONTENTS GAUGE CONNECTOR BOX
58 AILERON TAB OPERATING LEVER
59 AILERON SHROUD SCREENS
60 AILERON OUTBOARD HINGE PIN
61 FLUX DETECTOR (starboard side); ELECTRICAL CONNECTIONS (port side) ▶

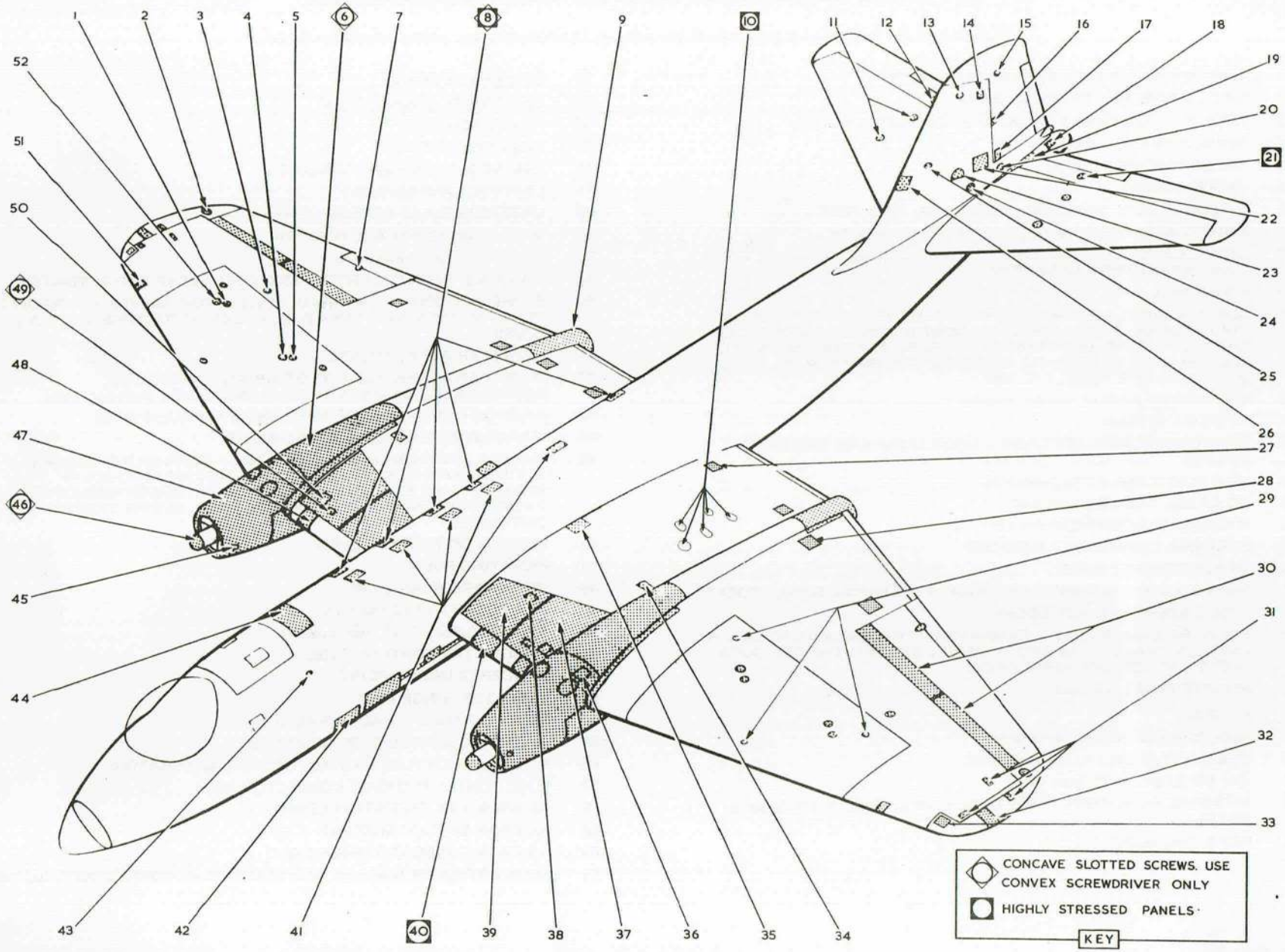


FIG. 5. ACCESS PANELS—UPPER SURFACE AND PORT SIDE

◀NEW ITEMS 27 AND 28 ADDED▶

## KEY TO FIG.5 (ACCESS PANELS, UPPER SURFACE AND PORT SIDE)

*All panels in the main plane are on both the port and starboard sides, unless otherwise stated*

1 INTEGRAL FUEL TANK FILLER CAP, OUTBOARD COMPARTMENT
2 AILERON HINGE
3 MAIN PLANE SLINGING POINTS
4 VENT VALVE, INBOARD COMPARTMENT, INTEGRAL FUEL TANK
5 INTEGRAL FUEL TANK, FILLER CAP, INBOARD COMPARTMENT
6 ENGINE UPPER REAR COWLING
7 AILERON TAB OPERATING LEVER
8 FUEL TANK FILLER CAPS
9 JET PIPE REAR CONE – JET PIPE ADJUSTMENT POINTS: THERMOCOUPLES
10 RADAR/RADIO
11 TAIL PLANE SLINGING POINTS
12 ELEVATOR GEARED TAB CONTROL
13 FIN SLINGING POINT
14 AERIAL PLUG
15 RUDDER SLINGING POINT
16 RUDDER TAB OPERATING LEVER
17 RUDDER CONTROL TUBE ATTACHMENT (port side): RUDDER TAB ACTUATOR (starboard side)
18 REAR CONE ATTACHMENT
19 REAR FAIRING ATTACHMENTS: TAIL PLANE ACTUATOR TOP ATTACHMENTS
20 RUDDER LOW HINGE
21 ELEVATOR SPRING TAB CONTROL
22 RUDDER LOWER MASS-BALANCE WEIGHT: FIN REAR ATTACHMENT
23 FIN SPAR ATTACHMENT
24 REAR FUSELAGE SUPPORT STRUT
25 AERIAL SWITCH
26 FIN FORWARD ATTACHMENT POINT
◀ 27 MAIN PLANE REAR ATTACHMENT POINT, FLAP ADJUSTMENT POINTS, HYDRAULIC PIPES, WING TIP TANK FUEL TRANSFER PIPE, ELECTRICAL CONNECTIONS
28 FLAP ADJUSTMENT POINTS
29 INTEGRAL FUEL TANK SLINGING POINTS
30 AILERON SHROUD SCREENS
31 WING TIP FUEL TANK EXPLOSIVE ATTACHMENT BOLTS
32 WING TIP FUEL TANKS AIR AND FUEL CONNECTIONS
33 NAVIGATION AND TAXYING LAMPS
34 MAIN UNDERCARRIAGE UP-LOCK HOOK
35 MAIN SPAR ATTACHMENT
36 CONTROL UNIT BLEED VALVE
37 ACCESSORIES GEARBOX: TWO-SPEED GEARBOX: MIXING VALVE (port side); CONSTANT-FLOW VALVE (port side)
38 DIPSTICK, COLD AIR UNIT (port side)
39 COLD AIR UNIT (port side): HYDRAULIC, FUEL AND AIR PIPES: SUPPRESSOR: FUEL FLOW TRANSMITTER: AIR COOLER: HYDRAULIC ACCUMULATOR, CUT-OUT VALVE AND NON-RETURN VALVES (starboard side)
40 SERVICE PANEL (port side)
41 TANK VENTING GALLERIES COUPLING POINTS
42 ELECTRICAL ACCUMULATORS: NOSE UNDERCARRIAGE GROUND SELECTOR: CABIN AIR SYSTEM SILENCER: FLYING CONTROL RODS AND CONNECTING LEVERS
43 FRONT FUSELAGE JACKING POINT
44 EQUIPMENT BAY HATCH – OXYGEN BOTTLES: HYDRAULIC RESERVOIR
45 TURBO-STARTER EXHAUST
46 ENGINE STARTER HOUSING
47 ENGINE FRONT COWLING
48 HYDRAULIC PUMP
49 DIPSTICK, TWO-SPEED GEARBOX
50 ACCESSORIES GEARBOX OIL FILLER CAP
51 ILS AERIAL
52 VENT VALVE, OUTBOARD COMPARTMENT, INTEGRAL FUEL TANK ▶

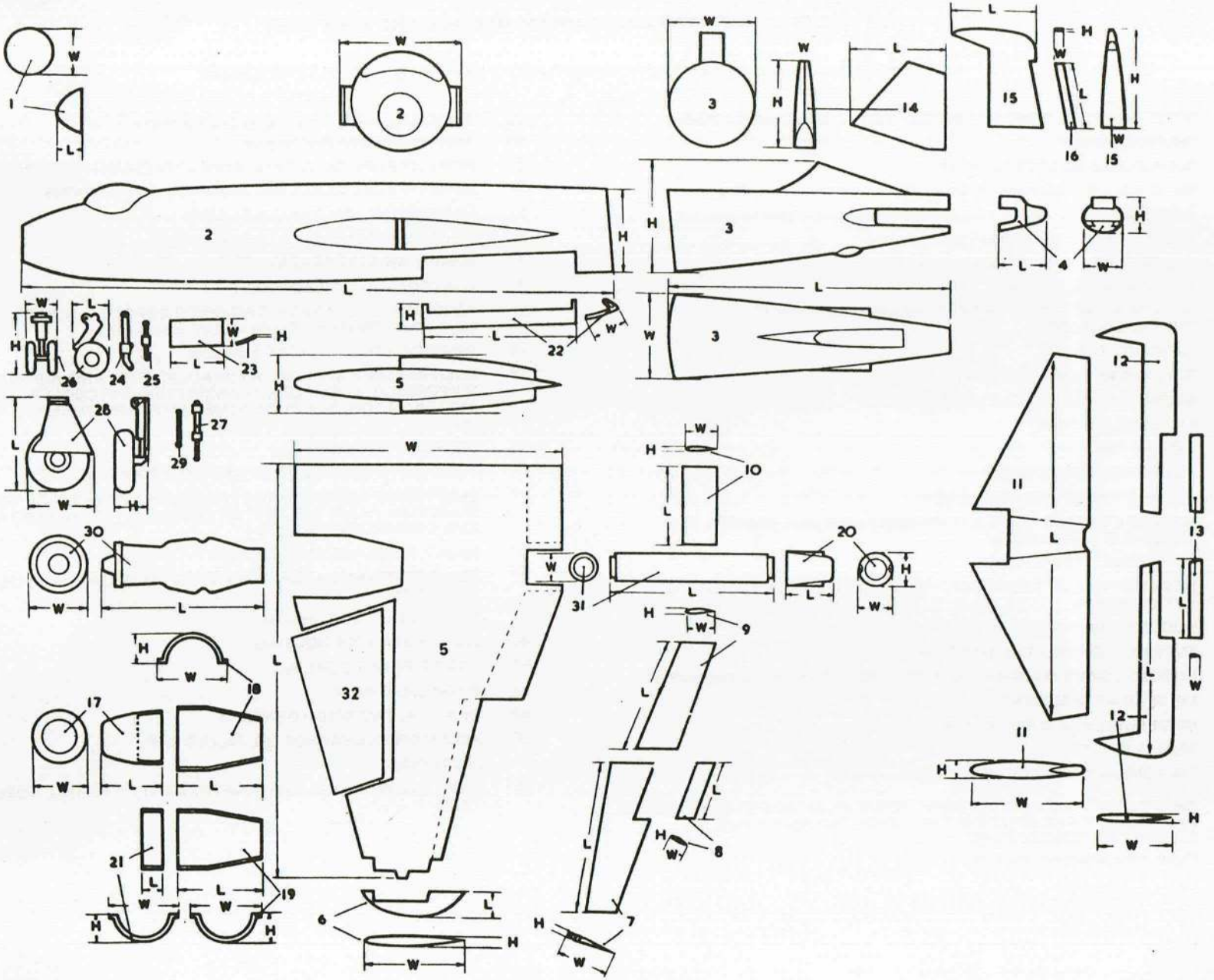

FIG.6. COMPONENT WEIGHTS AND DIMENSIONS

## KEY TO FIG.6 (COMPONENT WEIGHTS AND DIMENSIONS)

| Item No. | Component | Length (L) | Width (W) | Height (H) | Tare weight (lb) | Equipped weight (lb) |
|---|---|---|---|---|---|---|
| 1 | NOSE FAIRING | 1 ft 5 in. | 2 ft 7 in. diameter | – | 56 | – |
| 2 | FRONT FUSELAGE | 42 ft 1 in. | 7 ft 7 in. | 6 ft 6 in. | 2735 | 5470 (less fuel) |
| 3 | REAR FUSELAGE | 19 ft 1 in. | 5 ft 10 in. | 7 ft 11 in. | 510 | 600 |
| 4 | REAR CONE | 4 ft 9 in. | 2 ft 5 in. | 2 ft 10 in. | 25 | 65 |
| 5 | MAIN PLANE | 29 ft 1 in. | 19 ft 0 in. | 4 ft 3 in. | 2352 | 2862 |
| 6 | WING TIP | 1 ft 8 in. | 7 ft 8 in. | 10 in. | 16 | – |
| 7 | AILERON | 12 ft 6 in. | 1 ft 3 in. | 9 in. | 93 | – |
| 8 | AILERON TAB | 4 ft 2 in. | 8 in. | 2 in. | 3 | – |
| 9 | FLAP, OUTBOARD | 8 ft 11 in. | 2 ft 9 in. | 3 in. | 31 | – |
| 10 | FLAP, INBOARD | 5 ft 7 in. | 2 ft 6 in. | 3 in. | 22 | – |
| 11 | TAIL PLANE | 26 ft 0 in. | 7 ft 9 in. | 1 ft 6 in. | 495 | – |
| 12 | ELEVATOR | 13 ft 11 in. | 4 ft 5 in. | 5 in. | 85 | 110 (with balance weight) |
| 13 | ELEVATOR TAB | 5 ft 7 in. | 8 in. | 2 in. | 7 | – |
| 14 | FIN | 6 ft 4 in. | 1 ft 6 in. | 6 ft 9 in. | 94 | – |
| 15 | RUDDER | 7 ft 1 in. | 1 ft 3 in. | 7 ft 0 in. | 132 | – |
| 16 | RUDDER TAB | 5 ft 5 in. | 9 in. | 2 in. | 7 | – |
| 17 | ENGINE FRONT COWLING | 4 ft 9½ in. | 3 ft 10 in. | 3 ft 10 in. | 59 | – |
| 18 | ENGINE TOP REAR COWLING | 5 ft 5 in. | 2 ft 0 in. | 1 ft 3 in. | 30 | – |
| 19 | ENGINE BOTTOM REAR COWLING | 5 ft 5 in. | 2 ft 0 in. | 1 ft 3 in. | 33 | – |
| 20 | JET PIPE COWLING | 3 ft 8 in. | 2 ft 8 in. | 2 ft 7 in. | 21 | – |
| 21 | SERVICE PANEL | 2 ft 2 in. | 2 ft 0 in. | 1 ft 9 in. | 15 | – |
| 22 | FLARE-BAY DOOR | 11 ft 5 in. | 3 ft 0 in. | 1 ft 8 in. | 112 | – |
| 23 | NOSE UNDERCARRIAGE DOOR | 4 ft 2 in. | 1 ft 5 in. | 3 in. | 9 | – |
| 24 | NOSE UNDERCARRIAGE RADIUS ROD | 3 ft 11 in. | 4 in. | 8 in. | 20 | – |
| 25 | NOSE UNDERCARRIAGE JACK | 2 ft 2 in. | 5 in. | 6 in. | 9 | 10 (filled) |
| 26 | NOSE UNDERCARRIAGE WHEEL AND LEG | 2 ft 2 in. | 1 ft 7 in. | 3 ft 7 in. | 230 | – |
| 27 | MAIN UNDERCARRIAGE JACK | 1 ft 11 in. | 4 in. | 7 in. | 14 | 16 (filled) |
| 28 | MAIN UNDERCARRIAGE WHEEL AND LEG | 6 ft 3 in. | 3 ft 11 in. | 2 ft 1 in. | 670 | – |
| 29 | MAIN UNDERCARRIAGE SIDE STAY | 2 ft 9 in. | 8 in. | 8 in. | 36 | – |
| 30 | ENGINE | 11 ft 0 in. | 3 ft 6 in. diameter | – | 2500 | – |
| 31 | JET PIPE | 12 ft 3 in. | 2 ft 2 in. diameter | – | 180 | – |
| 32 | MAIN PLANE INTEGRAL TANK | 11 ft 4 in. | 6 ft 9 in. | 2 ft 1½ in. | 426 | – |

TABLE 1

| FRONT FUSELAGE | NO OF DRAIN HOLES |
|---|---|
| DRAIN PLUG AFT OF FR. 7 | 1. |
| COAMING TUBE | 1 PORT 1 STBD. (SELF TAPPING SCREWS) |

TABLE 2

| CENTRE FUSELAGE | NO OF DRAIN HOLES |
|---|---|
| BELLY TANK | 3 WATER OUTLET VALVES |
| FLARE BAY DOORS | 6 |
| AFT OF FR. 29 | 2 |

TABLE 3

| REAR FUSELAGE | NO OF DRAIN HOLES |
|---|---|
| ACCESS IN REAR FUSELAGE FAIRING | 2 |
| BUMPER | 2 FWD. 2 AFT. |
| AFT OF FR. 42 | 2 |
| PICKETING PLUG | 1 |
| AFT OF FR. 46 IN FAIRING | 2 |

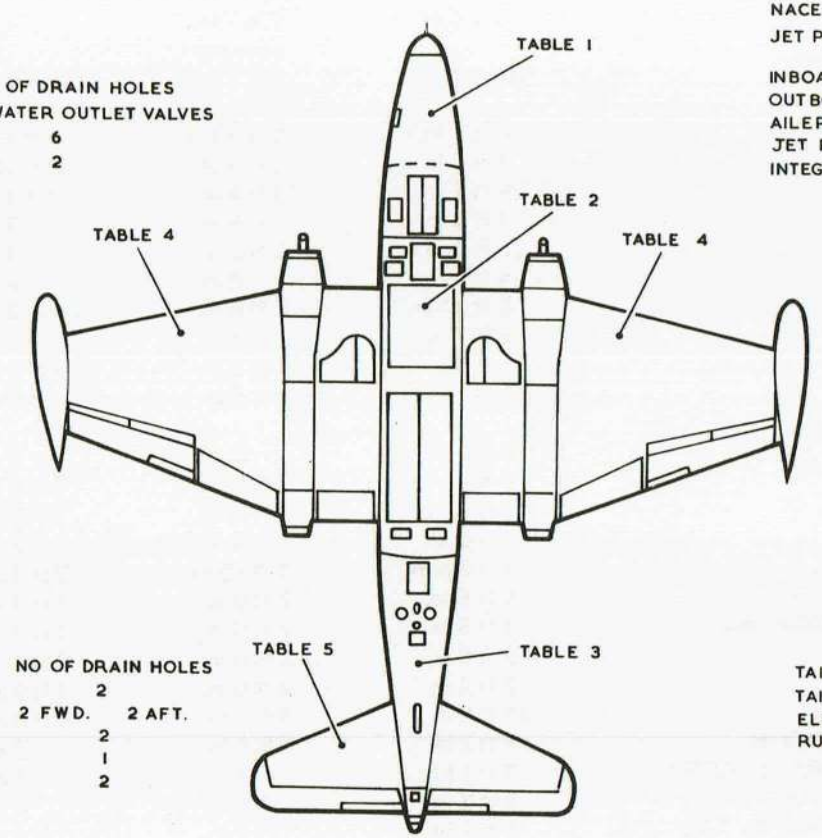


TABLE 4

| WING | NO OF DRAIN HOLES |
|---|---|
| FRONT COWLING INTAKE | 2 |
| SERVICE PANEL | 6 |
| LOWER REAR COWL | 21 |
| NACELLE | 18 |
| JET PIPE FAIRING | 10 1/8 IN. DIAMETER<br>10 1/4 IN. DIAMETER |
| INBOARD FLAP | 16 |
| OUTBOARD FLAP | 27 |
| AILERON | 39 |
| JET PIPE END CONE | 1 |
| INTEGRAL TANKS | 6 |

TABLE 5

| TAIL UNIT | NO OF DRAIN HOLES |
|---|---|
| TAIL PLANE | 8 |
| ELEVATOR | 5 |
| RUDDER TAB | T/HI |

FIG. 7. DRAINAGE HOLES

◀ TABLES 1 AND 5 AMENDED ▶

# Chapter 4A EXTERNAL FINISH AND MARKINGS

◀ *(completely revised)* ▶

**Introduction**

**1.** For data on external paint finish and markings, reference should be made to A.P.119A-0601-0 – AIRCRAFT PAINTING AND MARKINGS, BAe Drg. EB7-00-5203.

**2.** In service, care must be taken to maintain all servicing, safety and 'break-in' markings in a legible condition. This is essential to permit the correct replenishment of systems and safe emergency entries.

**3.** Any removal or deterioration of the external finish must be restored as soon as possible.

**4.** The static vent plates on the front fuselage are not to be painted or polished. They must be kept clean.

# Chapter 6 PROCEDURES FOLLOWING HAZARDOUS INCIDENTS

*(Completely revised)*

## LIST OF CONTENTS



## LIST OF APPENDICES

**General information**

1. This chapter deals with the special checks to be made, in addition to any normal servicing which may be due, following the report on Form 720 series of a hazardous incident.

**Hazardous incidents**

2. The term 'hazardous incident' means an occurrence apparent to an aircrew member or other individual in which an aircraft has, or may have, exceeded limits stated in its Release to Service document, or in which the aircraft structure or controls may have been damaged by abnormal operational conditions or loadings; the meaning of the term is further amplified in AP100A-01 Leaflet 316.
This class of damage can arise from:-

(1) A heavy landing.

(2) Overweight landings.

(3) Flight in excessive g conditions.

(4) Flight through turbulent air.

(5) Buffeting/vibration during flight.

(6) A lightning strike.

(7) Violent braking.

(8) Over-running of paved surfaces.

(9) Abnormal ground handling incidents.

**Examination following hazardous incidents**

3. Following a hazardous incident an examination is to be carried out as detailed in the appropriate appendix.

**Safety precautions**

4. The following general safety precautions apply throughout the chapter. Safety precautions peculiar to the different items of equipment will be found immediately preceding the relevant servicing instructions.

(1) All personnel must refer to the LETHAL WARNING marker card before entering the cabin or commencing any operation upon the aircraft.

(2) The N.C.O. immediately in charge of airframe servicing is the only person allowed to authorize the following:-

(a) Work by armament tradesmen on such equipment.

(b) Entry by any person into a cabin or compartment containing ejection seats, cartridge and detonator operated jettison equipment.

(c) The fitting, removal, or repositioning of any safety device.

(3) Upon completion of authorized servicing, all tradesmen concerned must report to the N.C.O. immediately in charge of airframe servicing.

(4) The bomb door operating switch lock must be fitted before any work is commenced in the bomb bay.

(5) Functional tests of electrical equipment must not be carried out during refuelling and defuelling operations.

(6) Before connecting an external electrical power supply, the pressure head heater switch must be OFF.

**Servicing notes**

5.

(1) The examinations and checks detailed in this chapter are to be carried out by a Senior N.C.O. assisted by tradesmen as required.

(2) Unless otherwise stated, damage found during this servicing is to be categorized and repaired in accordance with A.P.101B-0400-6.

(3) The appendices list renewals and adjustments which may be made. Renewals are not to be commenced until all examinations have been completed and the overall damage assessed.

(4) The instructions have been compiled to cover any possible damage resulting from any type of hazardous incidents reported by the captain or pilot on Form 720 series. Discretion is to be used in regard to the extent to which the relevant instructions are applied.

(5) Details of new or serviced components fitted during the servicing must be entered in the relevant columns of Form 720 series.

(6) The tradesmen responsible must sign for the completed servicing in the relevant columns of Form 720 series.

**Definitions**

6. The definitions of technical operations mentioned in this chapter are contained in A.P.101B-0400-5A2, Sect.1.

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# Appendix 1 HEAVY LANDINGS

## LIST OF TABLES

## TABLE 1

### Airframe

*(This table details the examination and checks to be carried out)*

**WARNING**
**Refer to the general safety precautions listed in para.3.**

| ITEM NO. | ITEM | OPERATION | A.P. REFERENCE | RECTIFICATION | A.P. REFERENCE |
|---|---|---|---|---|---|
| | | ALIGHTING GEAR | | | |
| 1 | MAIN UNDERCARRIAGE<br>(a) Shock absorber struts | (i) Examine for normal and equal extension<br>(ii) Examine for oil leaks | Sect.2, Chap.2<br>1803P, Vol.1, Sect.6 | (i) Adjust air pressure<br>(ii) Slight leaks — recharge strut<br>(iii)Serious leaks — indicate gland failure — renew strut | Sect.3, Chap.5<br>Sect.3, Chap.5<br>Sect.3, Chap.5 |
| 2 | NOSE UNDERCARRIAGE<br>(a) Shock-absorber strut | (i) Examine for normal extension<br>(ii) Examine for oil leaks<br>Note . . .<br>*The white line painted on the shock-absorber strut will be obscured if the pressure is low.* | Sect.2, Chap.2<br>1803E, Vol.1, Sect.6 | (i) Recharge strut<br>(ii) Slight leaks — recharge struts<br>(iii)Serious leaks — indicate gland failure — renew strut | Sect.3, Chap.5<br>Sect.3, Chap.5<br>Sect.3, Chap.5 |
| | | Jack and trestle the aircraft. Support the rear fuselage with No.7 universal jacking trestle and former, at frame 42. | Sect.2, Chap.4 | | |
| 3 | MAIN UNDERCARRIAGE<br>(a) Torque links | (i) Examine for damage<br>(ii) Check clearance at centre pivot pin. Permissible clearance between 0.001 in. and 0.010 in. | Sect.2, Chap.2<br>1803P, Vol.1, Sect.6 | (i) Renew torque links<br>(ii) Clearance in excess of limit to be rectified by fitting new washer (Ref.No.26FZ/715) with the thickness adjusted to give a clearance of 0.001 in. to 0.004 in.<br>Note . . .<br>*Serious deviation indicates torque link twisted — renew torque link* | Sect.3, Chap.5 |
| | | (iii)Remove centre pivot pin and examine for bowing, cracks and shear | | (iii)Renew pivot pin | |
| | (b) Torque links, side stay, and main attachment lugs<br>(c) Side stays and stay links | Examine for damage | 1803P, Vol.2, Pt.3, Sect.6 | Renew if necessary | Sect.3, Chap.5 |
| | (d) Side stay upper attachment brackets | (i) Examine for damage<br>(ii) Examine securing nuts for movement, and bolts for shearing<br>(iii)Examine spar web in vicinity of brackets for damage | 101B-0400-6<br>Pt.1, Chap.3 | (i) Renew if necessary<br>(ii) Renew if necessary | |
| | (e) Retraction jacks | (i) Examine attachment fitting for damage<br>(ii) Examine rams for damage | 1803P, Vol.2, Pt.3, Sect.6 | Renew jacks | |

*continued . . .*

**TABLE 1 Airframe** — *continued*

| ITEM NO. | ITEM | OPERATION | A.P. REFERENCE | RECTIFICATION | A.P. REFERENCE |
|---|---|---|---|---|---|
| | (f) Shock-absorber strut attachment brackets | (i) Examine for damage | 101B-0400-6 Pt.1, Chap.3 | | |
| | | (ii) Examine for cracks in web and flanges, and in vicinity of bolt holes | | | |
| | | **Note . . .** *Access to internal parts of brackets can be obtained through lightening holes in web of inboard plate.* | | | |
| | | (iii) Examine bolts attaching top and bottom plates for shearing and signs of movement | | Renew bolts | |
| | | (iv) Examine all bracket-to-spar attachment bolts for shearing and signs of movement. | | Renew bolts | |
| ◀ | (g) Main wheels | **Note . . .** *When removing or refitting a wheel, it must be fully supported to prevent damage to the oil seal housing.* | | | |
| | | Remove for bay servicing | Sect.3, Chap.5 | Fit bay serviced item | 101B-0400-5B2 |
| | (h) Brake units | Remove for bay servicing | Sect.3, Chap.5 | Fit bay serviced item | 101B-0400-5B2 ▶ |
| 4 | NOSE UNDERCARRIAGE | | | | |
| | (a) Torque links | Examine for damage | | If defects exist, change complete strut | Sect.3, Chap.5 |
| | (b) Stay link attachment lugs | Examine for damage | | | |
| | (c) Main attachment lug | Examine for damage | | | |
| | (d) Retraction jack | (i) Examine attachment fittings for damage | 1803E, Vol.2, Pt.3 | (i) Renew jack | Sect.3, Chap.5 |
| | | (ii) Examine ram for damage | | (ii) Renew jack | Sect.3, Chap.5 |
| | (e) Shock absorber strut attachment bracket | (i) Examine for damage | 101B-0400-6, Pt.1, Chap.2 | | |
| | | (ii) Examine structure in vicinity for damage | | | |
| | (f) Attachment bracket top shearing bolts | (i) Examine for signs of shearing | | (i) Renew as necessary | |
| | | **Note . . .** *Damage is more likely to occur to top bolts but, if damage is suspected, all four bolts must be removed for examination.* | | | |
| | **Note . . .** *The following two items are applicable if damage has been found elsewhere in nose undercarriage or surrounding structure.* | | | | |
| | (g) Main pivot bolt | Remove and examine for damage | 1803E, Vol.2, Pt.3 | Fit new bolt | Sect.3, Chap.5 |
| | (h) Radius rod top and bottom attachment bolts | Remove and examine for damage | | Fit new bolts | Sect.3, Chap.5 |
| | (j) Radius rod stay link | Examine for damage | | Fit new stay link | Sect.3, Chap.5 |

*continued . . .*

**TABLE 1 Airframe** — *continued*

| ITEM NO. | ITEM | OPERATION | A.P. REFERENCE | RECTIFICATION | A.P. REFERENCE |
|---|---|---|---|---|---|
| | (k) Nose wheels | Remove for bay servicing | Sect.3, Chap.5 | Fit bay serviced item | 101B-0400-5B2 |
| 5 | ALIGHTING GEAR FUNCTIONAL TEST | | | | |
| | (a) Hydraulic fluid reservoir | Replenish with oil OM-15 | Sect.3, Chap.6 | | |
| | (b) Functional test | Refer to Sect.3, Chap.6, and:- | | | |
| | | (i) Check the accumulator pressure | Leading Particulars | | |
| | | (ii) Check cut-out valve operation | Leading Particulars | | |
| | | (iii) Raise and lower the alighting gear five times, and ensure that mechanical up and down locks function correctly. | Sect.3, Chap.5 | | |
| | | (iv) Check operating times<br>UP 14 sec.<br>DOWN 8 sec. | | | |
| | | (v) Check warning device | Sect.5, Chap.1 | | |
| | | (vi) Examine fairings and doors for correct fitting. | Sect.3, Chap.5 | | |
| | | (vii) Operate undercarriage emergency control, then reset. | Sect.3, Chap.11 | | |
| | | (viii) Check UP and DOWN locks | Sect.3, Chap.5 | | |
| | | (ix) Fit undercarriage down locks | Sect.2, Chap.1 | | |
| | | (x) Prime and bleed the system | Sect.3, Chap.6 | | |
| | | Lower the aircraft to the ground, and remove the jacks and trestle. | | | |
| 6 | MAIN PLANES | Remove the following access panels:-<br>1. Main spar attachment<br>2. Aileron control rods<br>3. Undercarriage pivot pin<br>4. Engine upper, and lower rear cowls<br>5. Uplock hook<br>6. Hydraulic pipes self-sealing couplings<br>7. Main plane rear attachment fitting<br>8. Main plane front attachment fitting | Sect.2, Chap.4 | | |
| | (a) Main spar in vicinity of undercarriage attachment bracket<br>(b) Skin in vicinity of attachment brackets, and ribs No.6 and 7 | Examine for:-<br>(i) Buckling, distortion and wrinkling<br>(ii) Pulled or sheared rivets | | | |
| | (c) No.6 and 7 ribs | (i) Examine for damage | 101B-0400-6 Pt.1, Chap.3 | If damage to rib 7 is found, engine jet pipe must be removed to permit a thorough examination of rib and surrounding structure<br>Remove bolts for further examination if damage is found at, or in vicinity of cleat. | Sect.4, Chap.1 |
| | | (ii) Examine cleat fittings each side of ribs immediately behind main spar for damage | | | |
| | | (iii) Examine bolt heads and nuts securing cleat fittings for shearing and signs of movement. | | | |
| | (d) Main plane attachment fittings | (i) Examine for damage<br>(ii) Examine bolts for shearing and signs of movement | | | |

*continued . . .*

**TABLE 1 Airframe** – *continued*

| ITEM NO. | ITEM | OPERATION | A.P. REFERENCE | RECTIFICATION | A.P. REFERENCE |
|---|---|---|---|---|---|
| | (e) Spar web and fuselage skin in vicinity of attachment fittings | Examine for damage | 101B-0400-6 Pt.1, Chap.3 | | |
| | (f) Main plane rear attachment fittings (frame 27) | Examine for cracks, and signs of movement, or shearing of attachment bolts | | | |
| | (g) Main plane forward attachment fittings | Examine for cracks, and signs of movement or shearing of attachment bolts. | | | |
| | (h) Leading edge diaphragm | Examine for damage | | | |
| | (j) Skin covering | Examine for damage | | | |
| | (k) Engine attachment fittings and pivots | (i) Examine fittings for damage<br>(ii) Examine engine mounting front outer brackets for damage<br>(iii)Examine engine mounting bolts for tightness | 101B-0400-6 Pt.1, Chap.3 | | |
| 7 | FUSELAGE<br>(a) Short longitudinal beams immediately forward of nose shock-absorber strut attachment | (i) Examine double row of rivets visible on fuselage skin for damage<br>(ii) Examine fuselage skin in vicinity of beams for damage<br>If strut attachment bracket bolts, or bulkhead carrying the bracket are damaged, of if defects found in (i) and (ii) above, then:-<br>(iii)Cut 3 in dia. hole in cabin floor at mid point between the two beams (starboard side of navigator's seat).<br>(iv)Examine beams for damage<br>(v) Carry out repairs. | 101B-0400-6 Pt.1, Chap.2<br><br><br><br><br>101B-0400-6 | | |
| | (b) Nose wheel well:-<br>(i) Vertical beam carrying radius rod rear attachments<br>(ii) Rear bulkhead<br>(iii)Side walls<br>(iv)Roof<br>(v) Horizontal beam on roof | Examine for damage | 101B-0400-6 Pt.1, Chap.2 | | |
| | (c) Fuselage skin immediately aft of wheel well at bottom curve of transport joint | Examine for damage. Small wrinkles may have existed before the heavy landing occurred and, as skin in this area is unstressed, they are to be ignored. | 101B-0400-6 Pt.1, Chap.2 | | |
| | (d) Fuselage skin at frame 17 (main plane forward attachment point) | Examine for damage | 101B-0400-6 Pt.1, Chap.2 | | |
| | (e) Tail plane attachment bolts | Examine for damage | 101B-0400-6 Pt.1, Chap.4 | | |
| | (f) Tail plane attachment fittings | Examine for damage | 101B-0400-6 Pt.1, Chap.4 | | |
| | (g) Tail protecting pad | Examine pad and fuselage in vicinity for buckling and damage | | | |
| | (h) Fire extinguishers | Examine for signs of discharge | Sect.4, Chap.5 | Discharge indicated by plunger protruding through cap. | |

*continued . . .*

TABLE 1 Airframe – *continued*

| ITEM NO. | ITEM | OPERATION | A.P. REFERENCE | RECTIFICATION | A.P. REFERENCE |
|---|---|---|---|---|---|
| 8 | AIRCRAFT GENERALLY<br>Carry out rigging check | | Sect.2, Chap.4 | | |

**Note . . .**

*1. If rigging dimensions are found to be correct, this cannot be assumed to indicate that no defects exist.*

*2. Fit all components removed, using new or serviceable items, and carry out necessary adjustments and repairs. Refit all access panels, and remove all tools, rags, and other materials used during the servicing of the aircraft. Enter details of new or serviced components fitted, and sign for completed servicing on Form 720 series.* ◀

▶ 9 DELETED

## TABLE 2

### Engines

*(This table details the examination and checks to be carried out)*

**WARNING**

**Refer to the general safety precautions listed in para.3.**

**SAFETY PRECAUTIONS**

(1) All starter cartridges are to be removed before commencing servicing.

(2) Before any servicing on the high energy igniter plugs or the H.T. wiring is commenced, the low tension supply cable to the input plug must be disconnected by an electrical tradesman, and a period of one minute allowed to elapse. This allows dissipation of stored capacitor energy, and prevents inadvertent discharge.

(3) The high-energy unit is not to be operated with the H.T. lead disconnected.

(4) The battery isolation switch must be set to OFF, and any external electrical supply disconnected, before loading the starter breech.

(5) When the turbo-combustion starter is cold (at normal air temperature), three cartridges may be fired at 1 min. intervals. If a cartridge fails to fire, wait 1 min. before trying the next cartridge, or making an investigation. After firing three cartridges in quick succession, a period of 10 minutes must elapse before reloading with a further three cartridges. If these cartridges are fired immediately, a period of 20 minutes must elapse before further reloading.

(6) Synthetic oil has a deleterious effect on aircraft finishes and electrical cables and, any spilled oil must be cleaned off immediately. Synthetic oils are also injurious to the skin and a prophylactic ointment must be applied to the hands before commencing work.

(7) The battery isolation switch must be set to OFF before commencing an external electrical supply.

| ITEM NO. | ITEM | OPERATION | A.P. REFERENCE | RECTIFICATION |
|---|---|---|---|---|
| 1 | ENGINE MOUNTINGS | | | |
| | (a) Forward outboard mounting bracket | Examine for cracks | | Renew if necessary |
| | (b) Forward outboard mounting support diaphragm brackets | Examine for cracks with the aid of torch probe and mirror attachment through the forward lightening hole in rib 1A in the outer wing. | | |
| | (c) Inner mounting brackets | Examine for damage | | Renew if necessary |
| | (d) Rear mounting brackets | Examine for damage | | Renew if necessary |
| | (e) Engine mounting brackets attachment bolts | Examine for damage. Check for fatigue cracking using N.D.T. in accordance with the appropriate N.D.T. procedure.<br>Note . . .<br>The bolt damage data should be recorded, collated and periodically sent to, BAe, Stress Office, Warton; for evaluation. | 119A-20001-1 | Renew if necessary |
| | If engine damage is suspected, refer to A.P.102C-1512 to 1517 Vol. , Part 2, Sect.3, Chap.2. | | | |
| | Fit all components removed, using new or serviceable items, and carry out necessary adjustments and repairs. Refit all access panels and remove all rags, tools and other materials used during the servicing of the engine installation. | | | |
| | Sign for completed servicing on Form 720 series. | | | |

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## TABLE 3

### Electrical system

*(This table details the examination and checks to be made to the electrical system).*

**WARNING**

**Refer to the general safety precautions listed in para.3.**

**SAFETY PRECAUTIONS**

(1) Before any servicing of the high-energy ignition units or the H.T. wiring is commenced, refer to the LETHAL WARNING marker card, and remove the fuses.

(2) The high-energy ignition units must not be operated with the H.T. cable disconnected.

(3) When using silicone compound, care must be taken to prevent compound making contact with the eyes.

(4) When removing lead acid batteries, disconnect the negative cable first. When refitting batteries, connect the positive cable first.

(5) When the engines are running, the battery isolation switch must be set to 'ON' before disconnecting external electrical supply.

(6) Functional tests of electrical equipment must not be carried out during refuelling or defuelling operations, and all electrical power must be OFF.

(7) Both internal and external electrical power supplies must be disconnected before any Breeze plug connections are broken. Electrical power supplies must not be re-connected until Breeze plugs have been refitted. All electrical circuits affected by disconnection of Breeze plugs, must be functionally tested when the plugs have been refitted.

(8) Dummy fuses must be fitted to all unused fuse positions.

(9) When components are removed for bay servicing, the appropriate circuit fuses must be removed, and dummy fuses fitted.

(10) When circuit fuses are removed to facilitate servicing, dummy fuses must be fitted.

(11) When servicing is completed, ensure that all dummy fuses, except those in unused fuse positions, are removed and the correct rating live fuses fitted.

| ITEM NO. | ITEM | OPERATION | A.P. REFERENCE | RECTIFICATION | A.P. REFERENCE |
|---|---|---|---|---|---|
| | | Before carrying out functional tests, plug in external electrical supply and switch 'ON'. On completion of tests, switch 'OFF' and disconnect external supply. | | | |
| | Battery<br>(a) Main lead acid battery stowage and adjacent structure<br>(b) Emergency lead acid battery stowage and adjacent structure | Examine for spilled electrolyte, and corrosion. | 113D series | If found, neutralise affected areas and inform airframe N.C.O. Paint with anti-sulphuric paint when requested by airframe N.C.O. | |
| | (c) Fire extinguisher circuit | Examine inertia switches. If switches have been tripped, all fire extinguishers will have been discharged. Disconnect extinguishers and inform engine N.C.O. | Sect.5, Chap.1 | Reset inertia switches, and carry out full functional test of circuit. Connect serviced fire extinguishers after fitting. | |
| | (d) Undercarriage micro switches | Examine for damage | | Renew if necessary | |
| | Refit all access panels, and remove all tools and other materials used during the servicing of the electrical systems. Sign for completed servicing on Form 720 series. | | | | |

## TABLE 4

### Instrument installation

*(This table details the examination and checks to be carried out.)*

**WARNING**
**Refer to the general safety precautions listed in para.3.**

**SAFETY PRECAUTIONS**

(1) Ensure that the battery isolation switch is set to OFF before connecting external supply.

(2) Before disconnecting any plug connections, both internal and external electrical supplies must be disconnected. Electrical supplies must not be re-connected until all plugs have been refitted.

(3) All electrical circuits affected by disconnection of plugs are to be function-tested after the plugs have been refitted.

| ITEM NO. | ITEM | OPERATION | A.P. REFERENCE | RECTIFICATION | A.P. REFERENCE |
|---|---|---|---|---|---|
| | | **Note . . .** *Examine the bonding of all components for serviceability and good connection during the course of this servicing.* | | | |
| | PRESSURE CABIN<br>(a) Flight instruments<br>(b) Engine instruments<br>(c) Miscellaneous instruments | Examine for damage and carry out functioning tests | 1275A series and 112G series | Renew items as necessary | Sect.5, Chap.2 |

Refit, or replace with new or serviced parts, all components removed and make necessary adjustments and repairs. Remove all tools, rags and other materials used during servicing. Refit access panels.
Sign for completed servicing on Form 720 series.

## TABLE 5

### Radar installations

*(This table details the examination and checks to be made to the radar installations.)*

**WARNING**

**Refer to the general safety precautions listed in para.3.**

**SAFETY PRECAUTIONS**

(1) Ensure that the battery isolation switch is set to 'OFF' before connecting external supply.

(2) Before disconnecting any Breeze plug connections, both internal and external electrical supplies must be disconnected. Electrical supplies must not be re-connected until Breeze plugs have been refitted.

(3) All electrical circuits affected by the disconnection of Breeze plugs are to be functionally tested after Breeze plugs have been refitted.

| ITEM NO. | ITEM | OPERATION | A.P. REFERENCE | RECTIFICATION | A.P. REFERENCE |
|---|---|---|---|---|---|
| | | Note . . . *Examine the bonding of all components for serviceability and good connection during the course of this servicing* | | | |
| 1 | AIRCRAFT generally | | | Rectify any defects already reported | |
| 2 | REAR FUSELAGE | | | | |
| | (a) I.F.F./S.S.R.1520 T/R Type 16928 Aerial switching unit Type 16941 and mounting | Examine for damage | 114J-0101-16 | Renew items as necessary | |
| | (b) RADAR ALTIMETER T/R HG 9050-D1 Mounting tray | Examine for damage | 116B-0208-1 | Renew items as necessary | |
| 3 | NAVIGATORS STATION D.M.E. T/R Type MI-591083-1 Ancillary equipment and mounting | Examine for damage | 114J-1700-16 | Renew items as necessary | |
| 4 | PORT WING DECCA DOPPLER 72 T/R and aerial assembly | Examine for damage | 114E-1600-16 | Renew items as necessary | |
| 5 | (a) I.F.F./S.S.R. | Carry out functional test | 114J-0101-16 | | |
| | (b) RADAR ALTIMETER | Carry out functional test | 116B-0208-1 | | |
| | (c) D.M.E. | Carry out functional test | 114J-1700-16 | | |
| | (d) DECCA DOPPLER 72 | Carry out functional test | 114E-1600-16 | | |
| ◄ 6 | (e) TACAN-ARI 18107/4 | Carry out functional test | 116B-0304-1 | | |

Refit, or replace as required, all components removed and carry out necessary adjustments and checks. Remove all tools, rags and other materials used during servicing. Refit access panels. Sign for completed servicing on Form 720 series. ►

## TABLE 6

### Radio installations

*(This table details the examination and checks to be made to the radio installations.)*

**WARNING**

**Refer to the general safety precautions listed in para.3.**

**SAFETY PRECAUTIONS**

(1) Ensure that the battery isolation switch is set to 'OFF' before connecting external supply.

(2) Before disconnecting any Breeze plug connections, both internal and external electrical power supplies must be disconnected. Electrical power supplies must not be re-connected until Breeze plugs have been refitted.

(3) All electrical circuits affected by the disconnection of Breeze plug connections are to be functionally tested after Breeze plugs have been refitted.

| ITEM NO. | ITEM | OPERATION | A.P. REFERENCE | RECTIFICATION | A.P. REFERENCE |
|---|---|---|---|---|---|
| | | **Note . . .** *(1) The bonding of all components is to be examined for serviceability and good connections* | | | |
| 1 | AIRCRAFT generally | | | Rectify defects already reported | |
| 2 | AERIALS | Examine for damage | | Repair or replace as necessary | |
| 3 | External I/C socket (Starboard wheel bay) | Examine for damage | | | |
| 4 | PILOT'S STATION INTERCOMMUNICATION Control unit Type 7681 | Examine for damage | | Repair or replace as necessary | |
| 5 | NAVIGATOR'S STATION | | | | |
| | (a) H.F. COMMUNICATIONS SYSTEM T/R Type 618T-3 Aerial tuner Type 490T/1 and shockmount tray 790Y/1 | Examine for damage | | Refer to manufacturers publications | |
| | Pre-amplifier Type UA 6002 | Examine for damage | 116N-0101-1 | | |
| | (b) DECCA V.O.R. (EAS 671) Receiver Type RV 671 Adapter Type RV 671 Control unit Type BN 671-4 Ancilliary equipment mountings | Examine for damage | 116B-0447-16 | Renew items as necessary | |
| | (c) INTERCOMMUNICATION Control unit Type 7681 Amplifier Type A1961 Ancilliary equipment and mounting | Examine for damage | 116N-0105-1 | Renew items as necessary | |

*continued . . .*

**TABLE 6 Radio installations** – *continued*

| ITEM NO. | ITEM | OPERATION | A.P. REFERENCE | RECTIFICATION | A.P. REFERENCE |
|---|---|---|---|---|---|
| 6 | UPPER EQUIPMENT COMPARTMENT | | | | |
| | (a) I.L.S. Receivers Types R1964 and R1965 | Examine for damage | 116B-0408-1 | | |
| | Mountings and tray | Examine for damage | | Renew items as necessary | |
| | (b) RADIO COMPASS Receiver Type AD7092D Ancilliary equipment mountings | Examine for damage | 116B-0107-1 | Renew items as necessary | |
| | (c) STANDBY U.H.F. T/R D403M and ancillary equipment Mountings and tray | Examine for damage | 116D-0107-1 | Renew items as necessary | |
| 7 | INNER WING PORT RADIO COMPASS Sense aerial amplifier Type 1628 | Examine for damage | 116B-0107-1 | Renew items as necessary | |
| 8 | NOSE STATION INTERCOMMUNICATION JB7682 JB7683 I/C JB | Examine for damage | 116N-0105-1 | Renew items as necessary | |
| 9 | REAR FUSELAGE V.H.F./ U.H.F. T/R PTR 175 and ancillary equipment | Examine for damage | 116D-0116-1 | Renew items as necessary | |
| | Mountings and tray | Examine for damage | | Renew items as necessary | |
| 10 | (a) V.H.F./U.H.F. AND STANDBY | Carry out functional test | 116D-0116-1 | | |
| | (b) I.L.S. | Carry out functional test | 116B-0408-1 | | |
| | (c) RADIO COMPASS | Carry out functional test | 116B-0107-1 | | |
| | (d) H.F. COMMUNICATIONS SYSTEM | Carry out functional test | Refer to manufacturers publications | | |
| | (e) DECCA V.O.R. | Carry out functional test | 116B-0601-1 | | |
| | (f) INTERCOMMUNICATION | Carry out functional test | 116N-0105-1 | | |

Fit all components removed during servicing, using new or serviced items, carry out necessary adjustments and repairs. Remove all tools, rags and other materials used during servicing of wireless systems and refit all access panels. Sign for completed servicing on Form 720 series.

# Appendix 2 OVERWEIGHT LANDINGS

*(To be issued later)*

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# ◀ Appendix 3 EXCESS G ▶

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**General information**

**1.** Check aircraft for damage whenever 5.0 'g' has been reached or exceeded. The indication that an aircraft has exceeded the maximum permissible 'g' loading is normally obtained from the fatigue meter, When an increase in the reading of the highest counter of the meter is recorded beyond the stated limit, an excess 'g' check is required. The limit is 5.1 'g' with the Mk.16 fatigue meter.

## TABLE 1

### Airframe

*(This table details the examination and checks to be carried out.)*

**WARNING**
**Refer to the general safety precautions listed in para.3.**

| ITEM NO. | ITEM | OPERATION | A.P. REFERENCE | RECTIFICATION |
|---|---|---|---|---|
| | | Carry out rigging checks. Correct rigging dimensions cannot be assumed to indicate that no defects exist. | | |
| 1 | MAIN PLANES<br>(a) Outboard wing | Inspect the outboard wing upper surface aft of the main spar, just outboard and inboard of rib 4 (inboard aileron hinge location) for skin buckling and rib distortion | 101B-0400-6 Pt.1, Chap.3 | Repair as necessary |
| | (b) Leading edge | Examine the corners of the air intake slots on the wing leading edge for distortion or cracking | 101B-0400-6, Pt.1, Chap.3 | Repair or renew as necessary |
| | (c) Outboard engine rib/main spar attachment | On aircraft pre Mod.1993 or 2545, remove the engine aft lower cowl and examine the cleats (Pt. No.EA3.20.223), securing the forward outboard engine rib at its lower attachment point to the main spar, for cracks as described in S.I./Can/55. | | Renew cleats and embody Mod.2545 |
| 2 | SERVICES<br>(a) Wing root services | Examine all wing root services i.e. fuel, cabin air, hydraulics, engine controls, generator controls for looseness of joints and chafing | 101B-0400-6, Pt.1, Chap.7<br>Sect.4, Chap.1<br>Sect.5, Chap.1 | Repair or renew as necessary |
| 3 | UNDERCARRIAGE | Jack and trestle the aircraft and carry out undercarriage retraction checks, Examine for alignment and locking of the main leg and 'D' doors, and check that the projecting skin tongue on the forward outboard end of the 'D' door is undamaged and fits correctly into the wing skin recess. Examine floor girder 18, in No.6 fuel tank bay at the forward door hinge point, for any distortion or buckling. | 101B-0400-6, Pt.1, Chap.5<br>101B-0400-6, Pt.1, Chap.2 | Repair or renew as necessary<br>Repair or renew as necessary |
| 4 | DELETED | | | |

# ◀ Appendix 4 FLIGHT TURBULENCE ▶

## LIST OF TABLES



## TABLE 1

### Airframe

**WARNING**

**Refer to the general safety precautions listed in para.3.**

| ITEM NO. | ITEM | OPERATION | A.P. REFERENCE | RECTIFICATION |
|---|---|---|---|---|
| 1 | AIRCRAFT generally | | | Rectify any defects already reported |
| 2 | MAIN PLANES | | | |
| | (a) Access panels | Remove the inner and outer panels from the upper surface, inner main plane. | Chap.4 | |
| | (b) Inner wing diaphragm | Examine, particularly for cracks, in area adjacent to main plane forward attachment point at fuselage frame 17 and in areas where pipes pass through the diaphragm. | 101B-0400-6, Pt.2, Leaflet C3/17. | Repair as necessary |
| | (c) Access panels | Refit. | | |
| 3 | DELETED | | | |

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# ◀ Appendix 5 BUFFETING/VIBRATION DURING FLIGHT ▶

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## LIST OF TABLES



### General information

1. The information contained in this appendix is intended as a guide to assist in the determination of sources of buffeting/vibration experienced during flight.

2. Table 1 lists possible sources of buffeting/vibration and the examinations required, but the possibilities of other sources should not be ruled out. Sources from engine running characteristics or malfunctions are not listed.

**Note . . .**

*(1) Although a diagnosis from an aircrew's report can identify the cause of buffeting/vibration, the source is more likely to be identified from a thorough physical inspection of the airframe and engine installation.*

*(2) Generally it is not expected that airframe faults will generate any vibrations with frequencies above about 25 cycles per second. If the reported vibration approaches this frequency, it is probable that a flying control circuit problem exists and particular attention should be paid to the elevator geared tab backlash.*

*(3) If the frequency of vibrations is in excess of 25 cycles per second, the most likely cause is an engine/airframe fault, regardless of any apparent effects of applied 'G' forces.*

## TABLE 1 – EXAMINATION OF POSSIBLE SOURCES OF BUFFETING/VIBRATION

**WARNING . . .**

**Refer to the general safety precautions in para.3 of the main chapter.**

| ITEM NO | POSSIBLE SOURCE | OPERATION |
|---|---|---|
| 1 | Jet pipe mounting | Check movement |
| 2 | Transport joints | Ensure tight |
| 3 | Tail plane leading edge/elevator horn | Examine and particularly for lack of continuity and check for correct gap |
| 4 | Fin and tail plane root area | Examine and particularly for poor continuity of joints, oil canning or poor finish |
| 5 | Fin stub | Examine and particularly for depressions or repair strips which might affect rudder spring tab |
| 6 | Elevator tab shrouds | Ensure not bent to obtain correct gap (gap obtained by trimming) |
| 7 | Tail plane/attachment points | Examine and particularly for excessive rock due to play at attachment points at fuselage |
| 8 | Tail plane stubs and root area | Check gaps |
| 9 | Control circuit | Check backlash, particularly elevator geared tab circuit |
| 10 | Air brakes | Examine and particularly to ensure that they lay flush with main plane and are not causing local distortion of the skin. |
| 11 | Flaps | Examine and particularly for trailing edge distortion due to flap jack load or, excessive looseness |
| 12 | All controls and tabs | Ensure they conform to weight and balance requirements of drawings |
| 13 | Mass balance weights | Ensure tight |
| 14 | Undercarriage doors | Ensure rigged correctly in undercarriage UP position. Ensure seals are intact and fitting correctly |
| 15 | Static vents | Examine particularly for correct contour |
| 16 | Entrance door | Check fit with and without cabin pressure |
| 17 | Bomb or flare bay doors | Ensure seals intact and fitting correctly |
| 18 | Canopy fairing | Examine particularly for correct contour and ensure fitting tightly |
| 19 | Inner main plane | Examine particularly for poor finish which might disturb air flows and eventually affect tail plane |
| 20 | Engine/airframe | Ensure no foul exists |

# ◀Appendix 6 LIGHTNING STRIKES▶

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**General information**

1. Lightning strikes usually result in two types of damage, that caused by the actual strikes, and that caused by the discharge of static electricity which follows the strike. It is also possible that heavy static discharges may occur without the aircraft having been struck by lightning. Further, it is possible that certain aircraft components may become strongly magnetized, it being probable that during the lightning discharge heavy electrical currents flow in the metal airframe structure. The magnetic field produced by such electric current is the cause of magnetization, this being an undesirable factor in the vicinity of a compass.

2. A lightning strike usually causes burning of small circular holes of approximately 1/8 in. dia., which may be clustered in one locality or scattered over a large area, results may also be indicated by burnt or discoloured skin, or rivets. Evidence of lightning strikes usually appears more prevalent in the fuselage nose section, and outer leading edges.

3. The effects of static discharge may occur as localized pitting or burning and may even result in circular holes of approximately 1/4 in. dia. Evidence of static discharge usually appears more prevalent on trailing edges, in the lower aft fuselage area, radio aerials and the main plane extremities, also on the fin and tail-plane tips and trailing edges.

**Examination procedure**

4. Whenever a lightning strike or static electricity discharge is reported, or if it is suspected that these conditions may have been encountered, the aircraft must be examined for evidence of such, as tabulated subsequently, at the first opportunity following the incident. It is emphasised, however, that where the term 'Examine' is used, the signs of damage being primarily sought are those of lightning strikes and static discharge as defined in para.2 and 3 respectively. The examination is divided into the following two categories:-

Table 1 – *Preliminary examination* – intended only for en-route aircraft landing away from base, to be followed upon return to base by:-

Table 2 – *Comprehensive examination* – the normal procedure to be carried out at base on termination of flight.

**Note . . .**

*Categorization does not of itself determine repair deferment policy. A decision to defer the rectification of ascertained damage must be related to the effect of the damage upon the airworthiness of the aircraft.*

◀ **Lightning strike responsibilities**

5. On termination of a flight in which the Captain knows or suspects that the aircraft has been struck by lightning, reference is to be made to AP100B-01, Order 4950 "Demagnetization of Aircraft Struck by Lightning". This order details the individual responsibilities of Aircrew, Station Engineering Personnel and Command Head-quarters. ▶

## TABLE 1

### Preliminary examination (En-route aircraft only)

| ITEM NO. | ITEM | OPERATION |
|---|---|---|
| 1 | (a) Ejection seats<br>(b) Canopy and hatch jettisoning systems | Ensure rendered safe |
| 2 | Fuselage exterior | Examine, paying particular attention to nose section, perspex transparencies for crazing, and fuselage underside and tail fairing. |
| 3 | (a) Tail plane surfaces<br>(b) Elevator surfaces<br>(c) Elevator tab surfaces | Examine, paying particular attention to trailing edges, tips and hinge areas. |
| 4 | (a) Fin<br>(b) Rudder<br>(c) Rudder tab | Examine, paying particular attention to trailing edges. |
| 5 | Main plane surfaces | Examine, paying particular attention to outer leading edges, trailing edges, root-ends, air intakes and hinge areas of the control surfaces. |
| 6 | (a) Aileron surfaces<br>(b) Aileron tab surfaces<br>(c) Flap surfaces<br>(d) Air brakes | Examine, paying particular attention to trailing edges and hinge areas. |
| 7 | Tip tanks | Examine |
| 8 | (a) Main wheel units<br>(b) Nose wheel unit | If extended at time of incident:-<br>Examine, paying particular attention to lower portions. |
| 9 | (a) Main flying controls<br>(b) Flaps<br>(c) Air brakes | Operate each system through full range and check for smooth freedom of movement. |
| 10 | Fire extinguisher discharged indicator | Examine and check by feel the indicator pin at the base of the extinguishers for protrusion; if the pin protrudes the extinguisher must be renewed. Examine the tell-tale windows in the discharge adapter of the Type 12A or 4AX extinguishers for colour change. |
| 11 | Navigation lamps | Operate, and check for correct functioning. |
| 12 | All aerials | Examine |
| 13 | (a) Radio equipment<br>(b) Navigation equipment | Operate, and check for correct functioning. |
| 14 | Pressure head | Examine |
| 15 | Compass | Carry out a check swing. |
| 16 | Static dischargers | Examine |

## TABLE 2

### Comprehensive examination (Normal procedure)

| ITEM NO. | ITEM | OPERATION | A.P. REFERENCE | RECTIFICATION |
|---|---|---|---|---|
| 1 | (a) Ejection seats<br>(b) Canopy and hatch jettisoning systems | Ensure rendered safe | 109-0107-1 | |
| 2 | Front fuselage | Examine, paying particular attention to (a) the perspex transparencies, (b) nose wheel doors and underside | 101B-0400-6, Pt.1, Chap.2 | (a) Polish or renew as necessary<br>(b) Repair as necessary |
| 3 | Rear fuselage | Examine, paying particular attention to the underside and rear fairing. Static discharge is usually indicated by a series of small holes along the underside at approximately the centre line. | 101B-0400-6, Pt.1, Chap.2 | Repair as necessary |
| 4 | (a) Tail plane<br>(b) Fin | Examine, paying particular attention to the trailing edges, tips and hinge areas of control surfaces. | 101B-0400-6, Pt.1, Chap.4 | Repair or renew as necessary |
| 5 | (a) Elevators<br>(b) Elevator tabs | (1) Examine paying particular attention to the trailing edges.<br>(2) Examine hinge assemblies, as far as practicable. If signs of static discharge or pitting are found, extend examination to include all bearing points in the control system. | 101B-0400-6, Pt.1, Chap.4 | Repair or renew as necessary |
| | | (3) Move the elevator and tabs through the full range of travel and check for freedom of movement and smooth operation. | Sect.3, Chap.4 | |
| 6 | (a) Rudder<br>(b) Rudder tab | (1) Examine, paying particular attention to the trailing edges.<br>(2) Examine hinge assemblies and tab-operating mechanism as far as practicable. If signs of static discharge or pitting are found, the examination must be extended to include all bearing points in the control system. | 101B-0400-6, Pt.1, Chap.4 | Repair or renew as necessary |
| | | (3) Move the rudder and tab through the full range of travel and check for freedom of movement and smooth operation. | Sect.3, Chap.4 | |
| 7 | Main planes | Examine paying particular attention to the outer leading edges, inboard undersurfaces, air intakes, trailing edges and hinge areas of flying controls, and skin joints | 101B-0400-6, Pt.1, Chap.3 | Repair as necessary |
| 8 | Tip tanks | Examine | 101B-0400-6, Pt.2, Leaflet C5/1 | Repair as necessary |

*continued . . .*

**TABLE 2 Comprehensive examination (Normal procedure)** – *continued*

| ITEM NO. | ITEM | OPERATION | A.P. REFERENCE | RECTIFICATION |
|---|---|---|---|---|
| 9 | Ailerons | (1) Examine, paying particular attention to the trailing edges<br>(2) Examine hinge assemblies, as far as practicable. If signs of static discharge or pitting are found, the examination must be extended to include all bearing points in the control system.<br>(3) Move the ailerons through the full range of travel and check for freedom of movement and smooth operation. | 101B-0400-6, Pt.1, Chap.3<br><br>Sect.3, Chap.4 | Repair or renew as necessary |
| 10 | Aileron tabs | (1) Examine, paying particular attention to the trailing edges.<br>(2) Examine hinge assemblies and tab-operating mechanisms.<br>(3) Operate the aileron tabs through the full range of travel and check for freedom of movement and smooth operation. | 101B-0400-6, Pt.1, Chap.3<br><br>Sect.3, Chap.4 | Repair or renew as necessary |
| 11 | Flaps | (1) Examine, paying particular attention to the trailing edges.<br>(2) Examine hinge assemblies. If signs of static discharge or pitting are found, extend the examination to include all bearing points in the flap control system.<br>(3) Disconnect flap operating rods at the rear ends.<br>(4) Move the flaps through the full range of travel and check for freedom and smooth operation.<br>(5) Reconnect flap-operating rods.<br>(6) Operate flap system through full range of travel and check for smooth operation | 101B-0400-6, Pt.1, Chap.3<br><br><br><br><br><br>Sect.3, Chap.4 | Repair or renew as necessary |
| 12 | Air-brake assemblies | (1) Extend and examine.<br>(2) Examine all hinge assemblies. If signs of static discharge or pitting are found, extend the examination to the operation jack bearings.<br>(3) Operate the air brakes and check for full and free movement and smooth operation. | Sect.3, Chap.2<br><br>Sect.3, Chap.4 | Renew as necessary |
| 13 | (a) Main wheel units<br>(b) Nose wheel unit | If extended at time of incident:-<br>Examine, paying particular attention to the lower parts of the shock-absorber struts and wheels | 104 series<br>1803E, Vol.1 | Renew as necessary |
| 14 | Aircraft generally | (1) If any aerials (or other protuberances) have broken away during incident, examine for incidental damage.<br>(2) Static dischargers | | Renew aerials and repair damage as necessary<br><br>Renew as necessary |

*continued . . .*

**TABLE 2 Comprehensive examination (Normal procedure) – *continued***

| ITEM NO. | ITEM | OPERATION | A.P. REFERENCE | RECTIFICATION |
|---|---|---|---|---|
| 15 | ELECTRICAL<br>(a) External lighting<br>(b) Cockpit lighting | Operate, and check for correct functioning | Sect.5, Chap.1, Group L | Renew as necessary |
| 16 | ENGINES<br>Fire extinguisher indicator | Check by feel, mechanical indicator pin at base of extinguisher for protrusion. If pin protrudes renew extinguisher. On Type 4AX extinguishers examine the tell-tale windows in the discharge adapter for colour change. | Sect.4, Chap.5 | Renew as necessary |
| ▶ 17 | Deleted | | | ◀ |
| 18 | Aerials | Examine | Sect.6, Chap2 | Renew as necessary |
| 19 | All connectors (aerials to trans/rec.) | (1) Disconnect.<br>(2) Examine, particularly end connections.<br>(3) Check for continuity and leakage from conductor to outer screen. | Sect.6, Chap.2 | Renew as necessary |
| 20 | Aerial switch units | (1) Examine, particularly connections and contacts.<br>(2) Check for continuity and leakage from conductor to outer screen in both energized and de-energized conditions. | Sect.6, Chap.2 | Renew as necessary |
| 21 | All connectors | Reconnect | | |
| 22 | Installation | Operate, and check for correct functioning | Sect.6, Chap.2 | |
| 23 | RADIO<br>Aerials | Examine. | Sect.6, Chap.1 | Renew as necessary |
| 24 | All connectors (aerials to trans/rec.) | (1) Disconnect<br>(2) Examine, particularly end connections<br>(3) Check for continuity and leakage from conductor to outer screen. | Sect.6, Chap.1 | Renew as necessary |
| 25 | Aerial switch unit | (1) Examine particularly connections and contacts.<br>(2) Check for continuity and leakage from conductor to outer screen in both energized and de-energized conditions. | Sect.6, Chap.1 | Renew as necessary |
| 26 | All connectors | Reconnect. | | |
| 27 | Installation | Operate, and using test equipment, check for correct functioning | Sect.6, Chap.1 | |

# ◄ Appendix 7 VIOLENT BRAKING ►

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**General information**

1. Following an emergency stop, violent braking, or overheating, the wheels, tyres and brakes must be removed and undergo full Bay Servicing.

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# Appendix 8 OVER-RUNNING OF PAVED SURFACES

*(To be issued later)*

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# Appendix 9 ABNORMAL GROUND HANDLING INCIDENTS

*(To be issued later)*

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