ML

PRESSURE HELMET

TYPE 12P, MK. 3 & MK. 4

DESCRIPTIVE, INSTRUCTION AND SERVICING MANUAL

THIRD EDITION

M L Aviation Company Ltd

White Waltham Aerodrome,
MAIDENHEAD, BERKSHIRE, ENGLAND.

A.I.D. & A.R.B. APPROVED

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THE M. L. PRESSURE HELMET IS
PATENTED THROUGHOUT THE WORLD

LIST OF CONTENTS

DESCRIPTION

SERVICING INSTRUCTIONS

CHECKING AND MAINTENANCE SCHEDULE FOR AIRCREW

PERIODIC SERVICING AND TESTING SCHEDULE FOR MAINTENANCE PERSONNEL

SERVICING, REPAIR AND REPLACEMENT INSTRUCTIONS

LIST OF APPENDICES

LIST OF ILLUSTRATIONS

LEADING PARTICULARS

Pressure Helmet, Type 12P (size 1 or size 2)

Mark 3	Pt. No. LS2236-123H
Mark 3(C)	Pt. No. LS2236-450H

R.A.F. Ref. Nos.

Mark 3 (size 1)	22C/2145
Mark 3 (size 2)	22C/2146

Pressure Helmet, Type 12P (size 1 or size 2)

Mark 4	Pt. No. LS2236-475H
Mark 4(G)	Pt. No. LS2236-460E
Mark 4(S)	Pt. No. LS2236-400E

N.A.T.O. Ref. Nos.

Mark 4(G) (size 1)	8475-99-1042864
Mark 4(G) (size 2)	8475-99-1042865

Note . . . *The manufacturer's Pt. No. refers to both size 1 (small) and size 2 (large) helmets. The correct size of helmet is recommended by M.L. Aviation Co. Ltd., on receipt of completed Personal Measurement Chart (Appendix 3). As a guide, experience has shown that the ratio is usually 60% size 1 and 40% size 2.*

Note . . . *The suffix after the Mark No. i.e., Mk. 3(C) – Mk. 4(G), etc., denotes modifications to standard, viz; breathing hose connector, requested by the Air Force concerned. Owing to the number of detail differences involved, this manual deals only with the basic Mark 3 and Mark 4 helmets and, where necessary, special instructions are enclosed separately with the helmet.*

Weight (approx.) Mark 3	5.5 lb. (2,5 Kg.)
Mark 4	6.6 lb. (3,0 Kg.)
Proof test pressure	4.0 P.S.I. (205 mm Hg.)
Breathing outlet valve (compensated)	Normalair O.P.5760
Breathing inlet valve	Normalair O.P.16277
Valve heater current consumption	8 watt (24 volt D.C.)
Breathing hose (length and construction variable to Mark)	¾ in. (18 mm) or ½ in. (12 mm) bore
Microphone (impedance variable to Mark)	Amplivox 13150
Telephones (impedance variable to Mark)	Amplivox 13850

Note . . . *Hose and electrical connectors, etc., variable to Mark.*

LEADING PARTICULARS *(Continued)*

The complete kit consists of the following:

One helmet (Mark as specified)	Pt. No. (as specified)
Spare helmet liner (size 1 or 2 – plain or ventilating type, variable to Mark)	Pt. No. (to suit above)
Spare pad (¼ in. thick)	Pt. No. LS2236-294B
Spare pad (½ in. thick)	Pt. No. LS2236-293B
Visor cover	Pt. No. LS2236-291B
Lissapol in container	Pt. No. LS2236-289D
Talc in container	Pt. No. LS2236-290D
Flannelette (1 yard of 4 in. x 2 in.)	Ref. 32B/398
Manual	W.W.133/25B

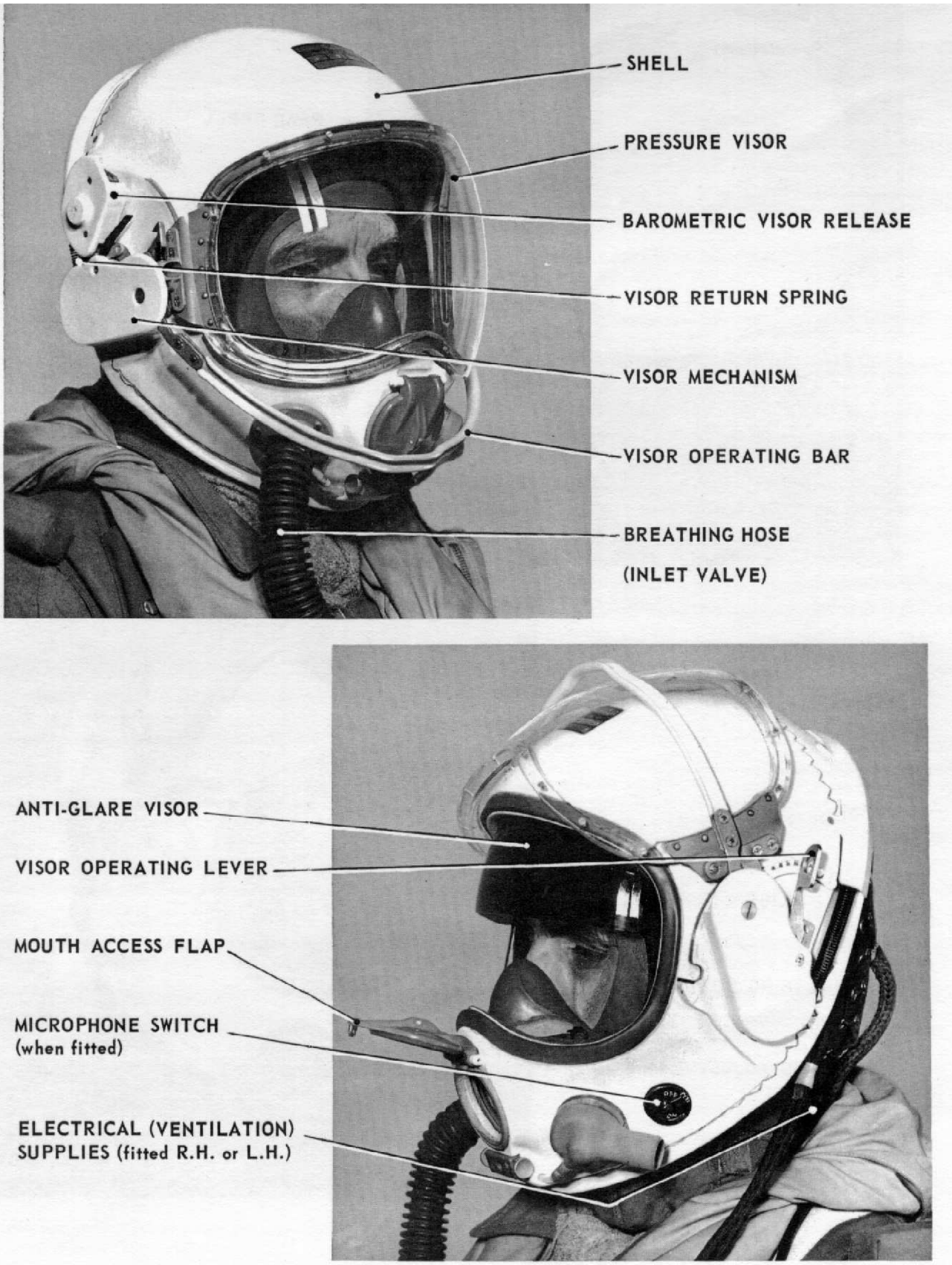


Fig. 1. Mark 3 Helmet

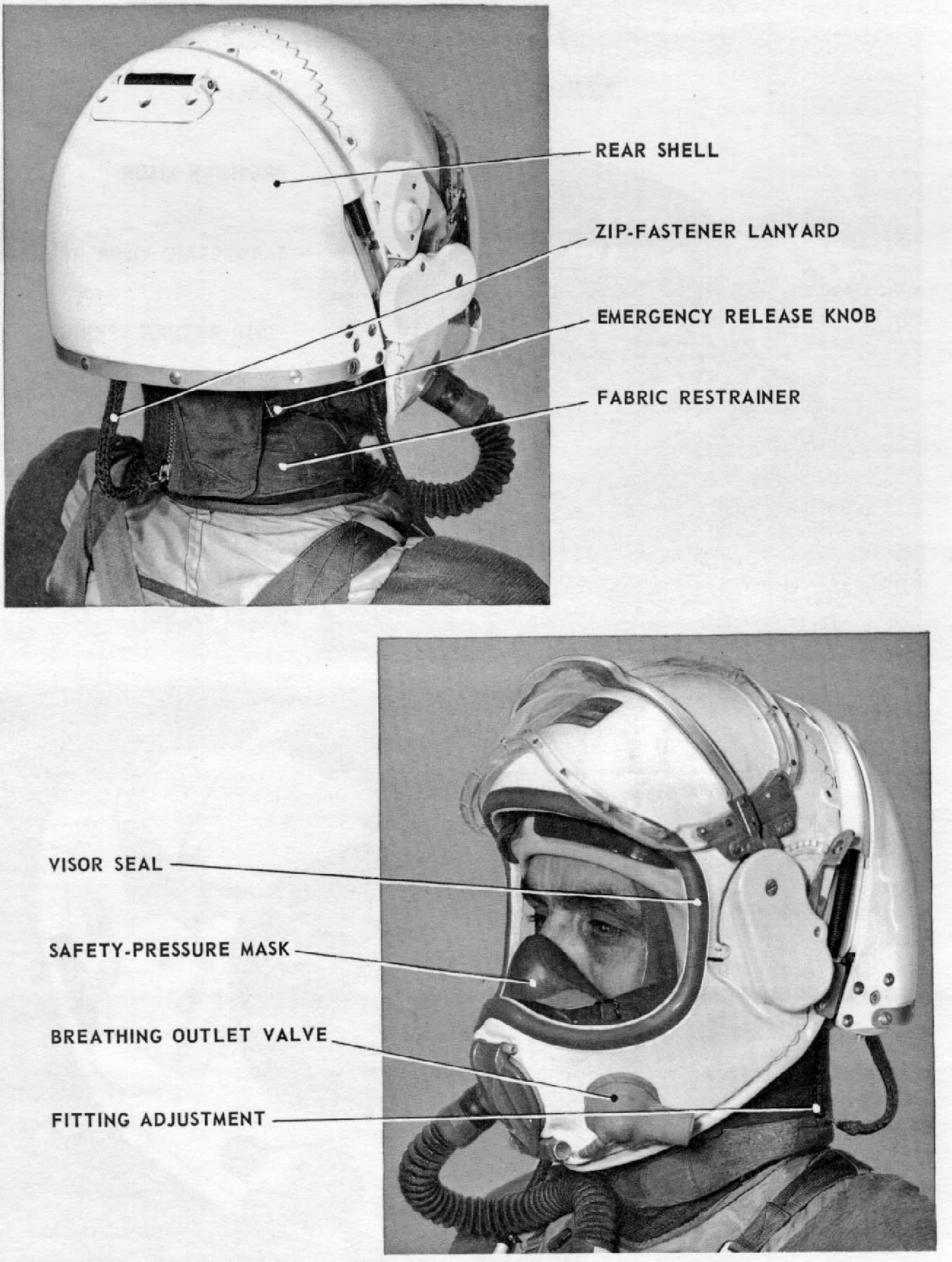


Fig. 2. Mark 4 Helmet

THE M.L. PRESSURE HELMET, TYPE 12P, MK. 3 & MK. 4

DESCRIPTION

Introduction

1. The M.L. Pressure Helmet is of the partial pressure type – for use with a partial pressure suit or jerkin – forming a component of an aircrew equipment assembly compatible with the flight-envelopes of modern high-performance aircraft. In addition to effecting survival at high altitude, by means of an automatically closing pressure visor, the helmet also provides crash and blast protection, a separate anti-glare visor, an intercommunication system, a mouth access flap and a ventilation system, if required.

The function of the helmet

2. The M.L. Helmet is an item of life-saving equipment for use in high altitude flight. Its primary purpose is to protect the wearer from the extremely dangerous effects of exposure to a rarified atmosphere, as the result of some failure of the aircraft cabin pressurisation.

3. To appreciate the need for such equipment it is necessary to understand our physiological needs with regard to the composition and pressure of the atmosphere. At standard sea-level pressure (760 mm Hg) the air we breathe comprises approximately 21% oxygen, the remainder being nitrogen and other inert gases which are inhaled and exhaled without any appreciable effect. If this neutral part is removed from a given volume of air, the remaining oxygen would fill that volume and the density of the oxygen molecules would be that corresponding to a pressure of approximately 158 mm Hg. This pressure is the key to the quantity of oxygen the body needs. Neglecting certain other considerations, a 100% oxygen gas concentration breathed at this pressure is sufficient to sustain life and taking into account aircrew work levels, can even be reduced to about 141 mm Hg. Reference to an altitude/pressure curve will show this latter pressure to be equivalent to 40,000 (fig. 3).

4. In general, aircrew may breathe normal air from sea-level up to 10,000 ft., without undue detriment, but lack of oxygen affects general faculties above this height and 100% oxygen – or preferably oxygen/air mixtures – are supplied up to 30,000 ft., where the transition to 100% oxygen is completed. The gas is fed at a slight positive pressure of 2 – 4 mm Hg., to ensure that the breathing mixture is not diluted by inwards leakage into the mask.

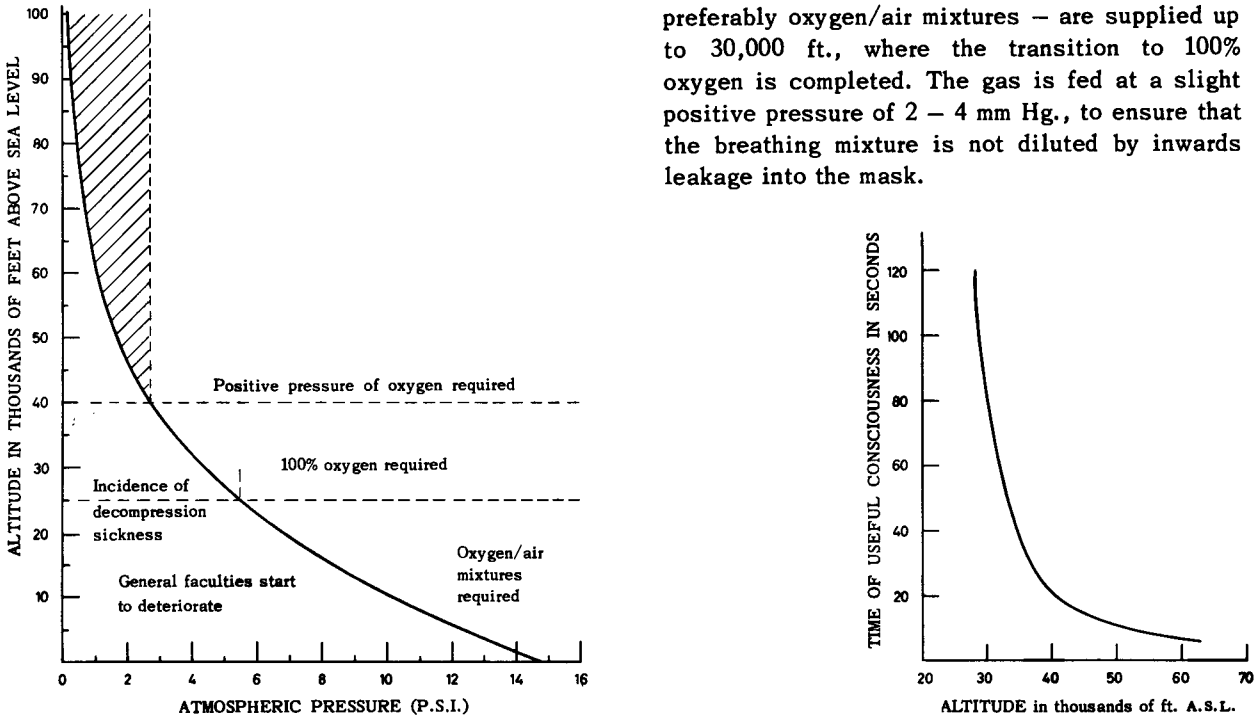


Fig. 3. Altitude/Pressure and Consciousness curves

5. These conditions are safe and comfortable up to an altitude of about 40,000 ft., – apart from a possibility of decompression sickness, or 'bends', from about 30,000 ft., which may effect a few individuals prone to it. Above 40,000 ft., decreasing ambient pressure will cause the gas to thin out to such a density that even a 100% oxygen concentration is insufficient to sustain life. The pressure of the oxygen supply must, therefore, be gradually increased in proportion with altitude in order to maintain the breathing supply at the required density. For example, at 70,000 ft., oxygen must be supplied at a pressure of approximately 107 mm Hg., to supplement the ambient pressure of 34 mm Hg., thus conforming to the minimum required pressure of 141 mm Hg., or 40,000 ft., equivalent.

6. The breathing of oxygen under pressure creates a differential between the pressure in the body and the external atmosphere. Generally speaking the difference is tolerable up to about 48,000 ft., after that it tends to cause sensible swelling of the body tissues and in extreme circumstances might even cause them to rupture. In normal high altitude flight, of course, the aircraft cabin is pressurised to counteract these conditions, the degree of pressurisation varying with the altitude. It is general practice, however, to allow the pressure to remain at ambient up to an altitude of about 25,000 ft., after which pressurisation commences, maintaining cabin pressure at this same simulated altitude of 25,000 ft. although greater altitudes are attained by the aircraft in flight. This simulated altitude of cabin pressurisation may vary with the role required of the aircraft and aircrew.

7. The greater the difference between the cabin pressurisation and the external atmosphere the greater the hazard should pressurisation be lost, whether by accident or by enemy action. Should this occur, either slowly by leakage or quickly (termed an 'explosive decompression'), by loss of the canopy, immediate steps must be taken to ensure that the aircrew are sustained with oxygen in conformity with the conditions previously specified. At any altitude over about 40,000 ft. loss of consciousness will occur, resulting eventually in death. There is a margin of a few seconds only at extreme altitude (fig. 3).

8. To combat this loss of pressurisation the oxygen supply pressure is automatically increased to the required density. Owing to this, however, body swelling and pain would occur and again cause loss of consciousness unless some measures are taken to prevent this by counter-pressure on the exterior of the head and body.

9. In the case of the body the necessary counter-pressure is applied by means of a two-piece partial pressure jerkin/trousers or one-piece suit, inflated to the pressure in the oxygen system. It is the function of the partial pressure helmet to perform the same service for the head in the soft, more vulnerable regions. Thus the term 'partial' pressure is used to denote, not that the degree of pressurisation is incomplete but that only certain areas of the body are held in restraint. The partial pressure system was originally proposed as a short-term method of protection but by careful design its duration at high altitude has been greatly extended – certainly adequate to provide physiological protection for existing and currently projected interceptor and combat aircraft.

10. Partial pressurisation in the M.L. Helmet is achieved by means of a bag of soft rubber which embraces the head from the cheeks to the nape of the neck. This bag is inserted in a rigid helmet of tough fibreglass and attached around the rim of a window aperture which is sealed, when required, by a transparent movable visor. A corresponding aperture in the opposite wall of the rubber bag is provided for the insertion of the airman's face, which thus, by filling the aperture, completes the sealing of the pressure bag. The rear of the helmet is closed by flexible fabric flaps joined by a zip type fastener, holding the complete helmet and pressure bag in position on the head. This arrangement enables the helmet to be donned very easily from the back without the need for the helmet and pressure bag to be drawn down over the top of the head. The flexible flaps permit the head to be inserted into the helmet from the rear and the face located in the sealing bag. The flaps are then overlapped and secured by the zip fastener.

11. The outstanding feature of the M.L. Helmet is the opening visor which enables the pilot to fly in near-normal conditions – that is the face is completely accessible and is not obstructed in any way. The window aperture is such that no visual obstruction exists. This is combined with an efficient individually adjustable oxygen mask which is capable of dealing with all the conditions specified up to 40,000 ft. With the M.L. Helmet in normal flight the window aperture

is open and the pressure bag unpressurised, ensuring the maximum comfort, since virtually the only extra items being worn in excess of the usual orthodox soft flying helmet, mask and protective helmet is the pressure bag around the face.

12. On emergency decompression the visor closes automatically and the oxygen regulator increases the pressure to the requisite amount. The oxygen then passes through the mask, filling the small pressure chamber formed by the closed visor and the face, and thus equalises the internal pressure in the respiratory system. At the same time the oxygen inflates the pressure bag so that the flesh of the neck and cheeks is restrained from swelling. At the back the pressure bag is formed with overlapping tongues which, when inflated, serve to balance the pressure in the small chamber between the visor and face so that the helmet does not move forward when pressurised. Similarly an area at the top is not enclosed by the pressure bag but is provided with a ring of soft material which seats on the head and forms a resilient spacing pad. This unpressurised space is made equal in area to the cross sectional area of the neck, hence when the bag inflates the areas balance and there is no tendency for the helmet to lift and become misplaced as in the case of the full pressure helmet. Areas around the ears are provided with effective sound excluding ear buns containing the telephone ear-pieces. This construction completely eliminates the need for restricting hold-down cables and neck ball-races, allowing normal unimpeded head movements during routine flight, easy donning, and rapid removal in emergencies such as a crash landing or ditching. The relative independance of the helmet makes it easy to integrate with a wide variety of clothing.

Donning the helmet

13. Details of each step in donning the helmet are given below and illustrated in figs. 6 to 9 inclusive. In the case of the Mark 4 helmet the rear shell is spring-loaded open and must be swung down and latched after donning. The separate collar illustrated in fig. 4 is a special order item for evaluation purposes. Normally the collar, if required, is supplied as part of the jerkin or suit, as illustrated in fig. 5. Its purpose is to increase comfort, by eliminating the possibility of the helmet bag chafing the neck during head movements, and to provide additional mechanical counter-pressure for the neck.

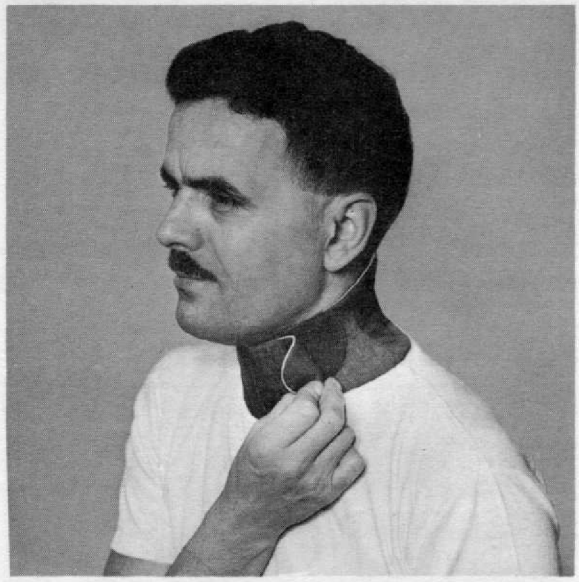


Fig. 4. Separate collar

(1) Wrap the collar around the neck and overlap the flap as shown (fig. 4).

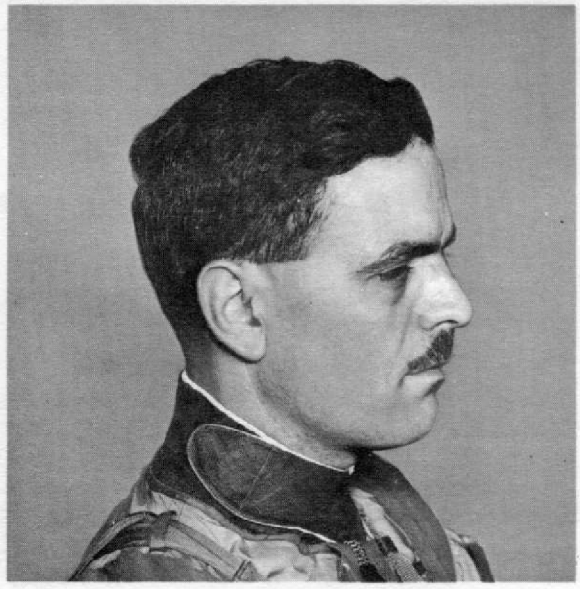


Fig. 5. Integrated collar

(2) The collar supplied as part of the jerkin or suit (fig. 5).

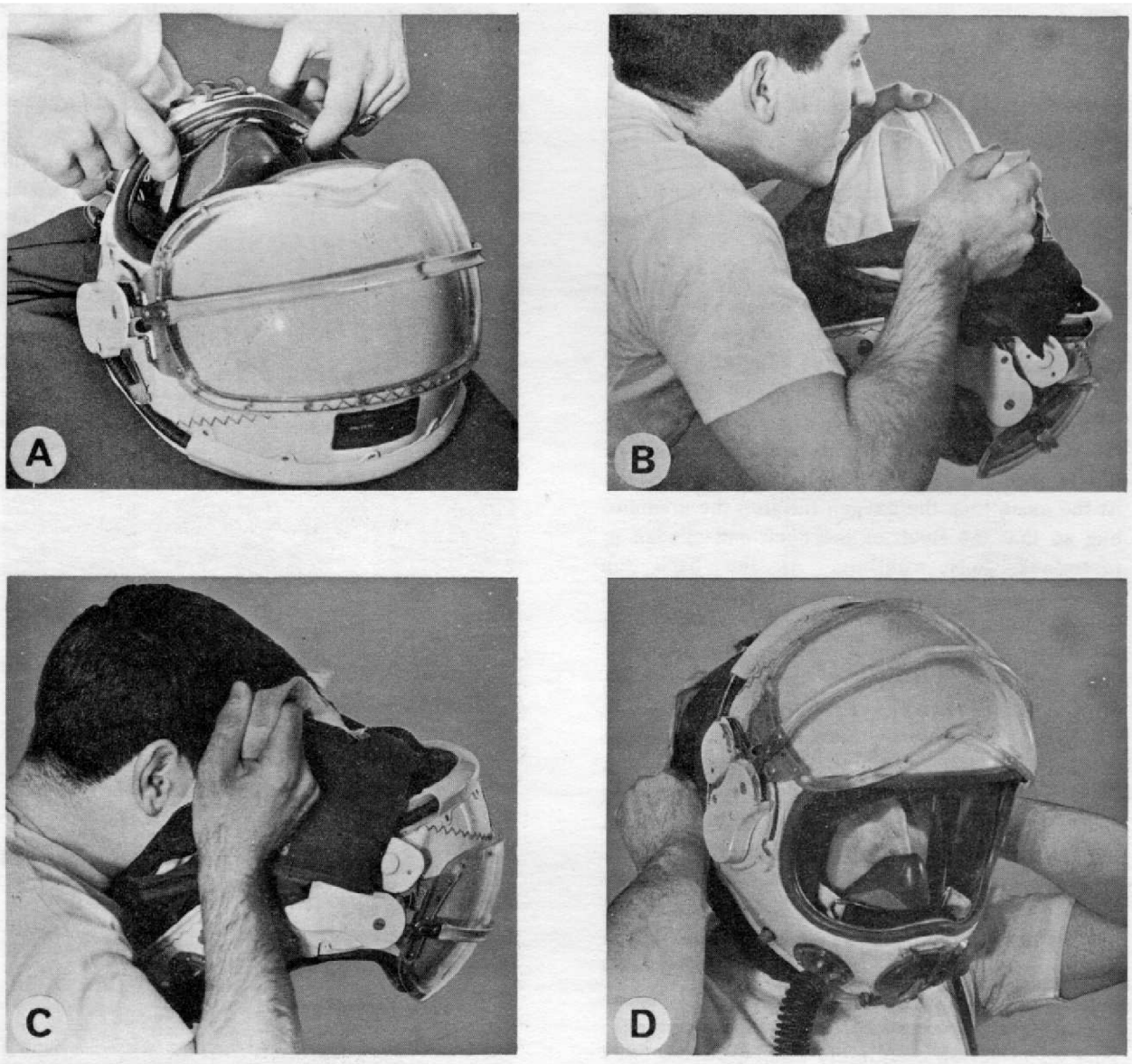


Fig. 6. Donning the helmet

(3) Open the visor, slacken the oxygen mask straps (fig. 6A). Even if the helmet is worn by the same individual, the oxygen mask straps must be slackened off each time the helmet is donned.

(4) Hold the helmet up to the face (fig. 6B).

(5) Pull the helmet on with the chin in a pronounced forward position (fig. 6C) aiming for connection into the oxygen mask.

(6) With the face almost settled into the mask (fig. 6D), bring the top of the helmet over the crown of the head (fig. 7A).

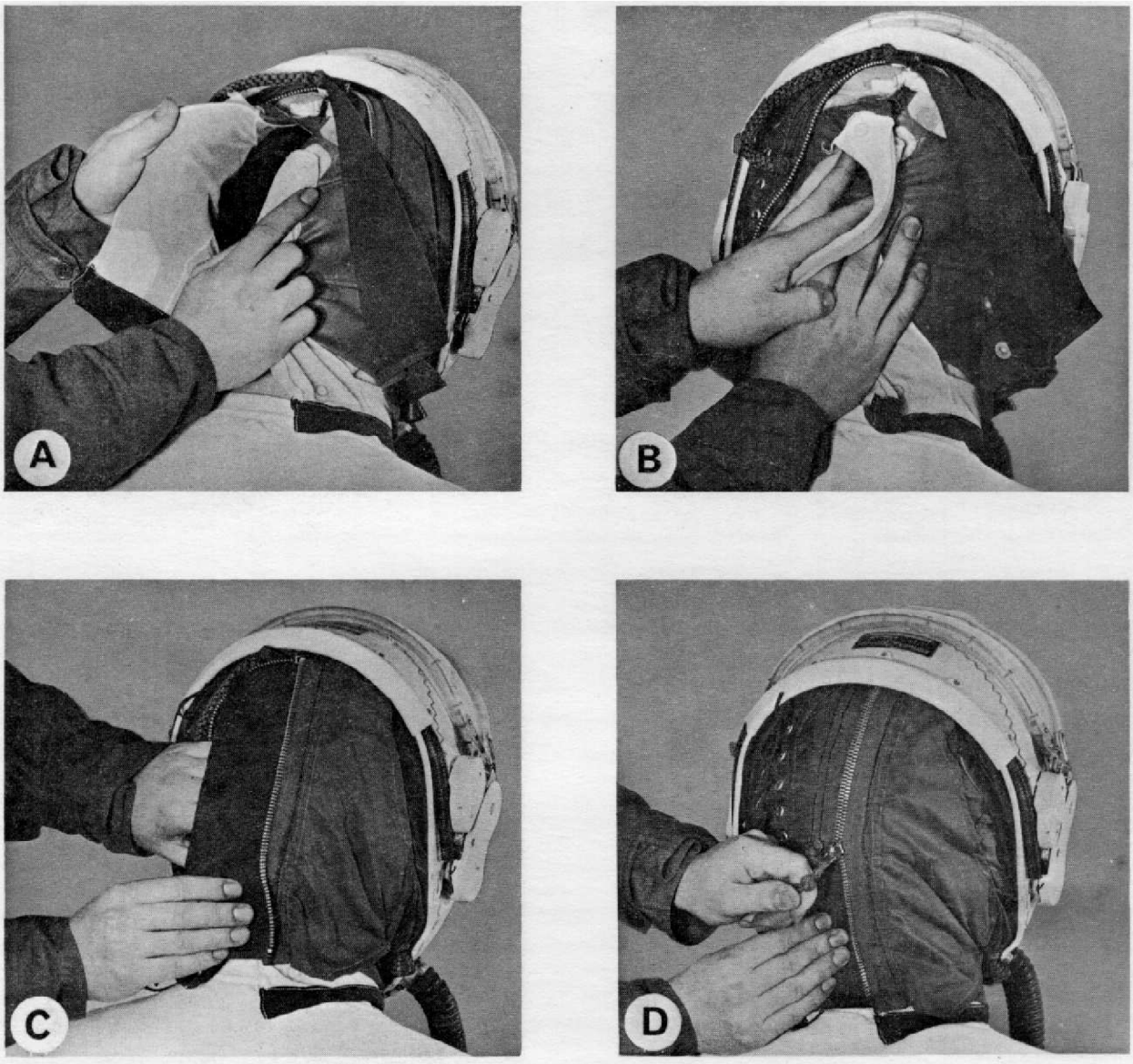


Fig. 8. Donning the helmet

(10) Starting at the top and working alternately left over right, pull each side of the bag around the back of the head obtaining as much overlap as possible. (See figs. 8A, 8B, 8C, 8D, 9A and 9B).

(11) If necessary, to facilitate closure of the zip-fastener, the adjustment straps below the lacing may be slackened before donning and then subsequently re-tightened.

Fig. 9. Donning the helmet

(12) Generally ease the helmet about the head to settle and bed down comfortably. Adjust the mask until it is sealing (fig. 9C).

(13) On the Mark 4 helmet, close the rear crash shell until it is latched (fig. 9D).

Using the helmet

14. Manual operation of the helmet is as follows :–

(1) To open the pressure visor – grip the operating bar and lift up across the front of the helmet. This visor will initially move outwards from the aperture and then swing upwards until it latches on the barometric release.

(2) To close – pull, or strike, the operating bar forward. The visor will spring down and seal in the aperture. If the mouth access flap happens to be open it will be shut by the descending operating bar.

(3) To operate the anti-glare visor – grip the operating lever and set to the

required position, registering against the serrated quadrant.

(4) To open the mouth access flap – press both buttons simultaneously. The flap will spring open.

(5) To close – press the flap down until it latches in the closed position.

(6) To open the rear shell – push both latch levers to the rear. The rear shell will spring open.

(7) To close – press the rear shell down until it latches in the closed position.

(8) To remove the helmet quickly in an emergency – firmly grip the release knob and give a sustained forward pull (slightly up and to the side). Normal removal is effected by separately unlatching the rear shell and operating the zip-fastener lanyard.

(9) On certain Marks of helmet there is a microphone on/off switch.

Description

15. The helmet main and rear shells are constructed of tough reinforced polyester glass-fibre laminate. The main shell has a window aperture which can be closed and sealed by a transparent movable visor. On the Mark 4 helmet the rear shell – which provides additional crash protection – is hinged to the top of the main shell for access when donning and is latched in the closed position.

16. The visor is attached to sleeves which slide over two arms pivoted on each side of the helmet, and is held in register with the face aperture by engagement of a roller on the visor with a notched cam plate on the side of the helmet. The visor is held inwards against the window aperture seal by the locking of toggles, linking the pivoting arms with the sliding sleeves. The toggle, in each case, is held in the locked position by the cranked end of the operating bar which pivots on a lug on the arm and presses the visor sleeve inwards, holding the rim tight against the window aperture seal. When the operating bar is moved upwards the toggle is broken and the rear lug (on the sliding sleeve) is drawn forwards raising the visor off the seal and disengaging the roller from the cam plate (fig. 10).

17. An additional lever, integral with the front toggle arm (which moves with the operating bar pivot), passes through a slot in both the sliding sleeve and the pivoting arm and presses against a plunger passing through the centre of the arm. This plunger is reacted at the rear end by another bellcrank tensioned by springs passing over the back of the helmet and anchored at the top.

18. The initial motion of the operating bar, when opening the visor and while the toggle is being broken and the visor raised out of the aperture, is transmitted via the plunger and bellcrank to tension the spring. When the spring is fully tensioned, the end fitting comes into contact with a projecting stop on the pivot arm and the visor is also lifted open with the continuing upward movement of the operating bar.

19. When fully open a spring catch on the right hand mechanism clicks into position over the barometric capsule hook. If the visor is closed by hand the catch is retracted by the initial downward movement of the bar only. When unlatched the tensions of the springs swing down the visor and subsequently lock it in the sealed position by pressing out the inner plungers and locking the toggles. If the visor is closed automatically the stop is retracted from under the latch by the expansion of the barometric capsule and the same sequence of operation occurs (fig. 11).

20. The anti-glare sun-visor is pivoted to the inside of the shell and can be set to any desired position; independently of the pressure visor, by means of a hand lever on the left-hand side of the helmet.

21. The visor is sealed in the pressurised role by an inflatable tube around the rim.

22. The mouth aperture below the visor has a sealed, hinged flap which springs open on release of the hand-operated catch. The finger buttons by means of which the catch is released, are arranged on opposite sides of the catch. *Both* buttons must be pressed simultaneously before the flap will spring open. The mouth aperture flap is coloured red and is prominently visible when open as a warning to close it after use. The flap snaps shut against the catch and seals against an O section rim seal. This seal is not inflatable since it requires sealing when the oxygen mask is in use in the non-pressurised

role. Should the mouth access flap be open when the barometric capsule operates, the operating bar pushes the flap shut during its descent by engagement with a cam profile mounted on the flap. The mouth access flap can only be opened very slightly when the operating bar is in the down position.

23. The interior of the helmet has a number of resilient spacers affording a protective cushion for all the more vulnerable points, and ear buns of glass wool material backed with fibreglass cups and having excellent sound attenuation properties. These buns surround the telephone ear-pieces and in conjunction with the spacers ensure that no rigid part of the helmet comes in contact with the wearer's head.

24. An interior double-walled pressure bag – overlapping at the back – embraces the entire head, except for an opening in the inner surface surrounding the face. The outer surface is sealed to the inside of the shell to contain – in conjunction with the closed visor – the inflation gas when pressurised. A fabric liner, detachable for laundering, is fitted to the inside of the pressure bag.

25. The rear of the helmet is of shaped nylon fabric closed with a zip-fastener. On the left-hand side a lacing panel and a strap adjustment are provided to accommodate variations of head fittings. A rip-panel, operated by an emergency release knob, is fitted on the right-hand side (fig. 12).

26. The rip-panel is closed by the engagement of stud and eyelet fasteners held by pins strung on a rip-cord. The rip-cord terminates in a knob, tack-stitched to the fabric, and is normally covered by a fabric flap. When the knob is pulled the stitches break and the pins are withdrawn from the rip-panel, opening the helmet.

27. On the Mark 4 helmet the rip-cord extends upwards to the vicinity of the hinge where it is tack-stitched and linked to two cables. The cables are contained in conduits fastened around the rear edges of the main shell and terminate in swaged pins at the rear shell latch positions. The pins are located in anchor blocks, permanently attached to the main shell and secure free catch blocks by means of machined half grooves. In normal helmet removal – using the zip-fastener – this mechanism remains static, the rear shell latches being disengaged manually from the catch blocks. However, in an emergency, when the knob is pulled the stitches break and the pins are withdrawn, releasing the catch blocks bodily with the rear shell (fig. 13).

28. The oxygen inlet hose is attached to the mounting containing the inspiratory valve on the right-hand side of the helmet at chin level. The expiratory valve is mounted on the opposite side and exhausts to the exterior of the helmet. On certain Marks of helmet these valves are transposed. The valve system is fully compensated for variations in inlet pressure and is electrically heated by an 8 watt element requiring a 24 volt (nominal) supply for which an external connector is provided. On certain Marks of helmet the heater is connected through a thermostat switch for automatic operation. The emergency oxygen line, when fitted, connects directly to the interior of the mask space on the right-hand side (fig. 14).

29. The microphone, mounted inside the mask, and the two telephones, mounted inside each ear-pad, are miniature moving-iron elements, tropicalised and sealed. External connection is provided by a cable from the rear of the helmet. The microphone on/off switch, when fitted, is on the left-hand side of the helmet.

30. The mask, adjustable by means of straps independently of the helmet itself, is used for oxygen breathing in normal conditions with the visor open. In an emergency due to loss of ambient pressure, the visor closes automatically by action of the barometric release and the oxygen inlet pressure is adjusted by the regulator to meet the increased demand, as necessary. All exterior outlets of the helmet are closed and the pressure bag around the head and the visor tube seal inflate. This tube is inflated through holes which communicate with the inside of the helmet. If a face blind is fitted to the ejection seat its operation will close the visor, by striking against the operating bar, should the ejection take place below the altitude at which the barometric release is set. On certain Marks of helmet the visor is closed automatically by the build up of g-forces during the ejection. The visor is constructed of two transparencies, spaced apart to form an air-space to prevent misting and freezing.

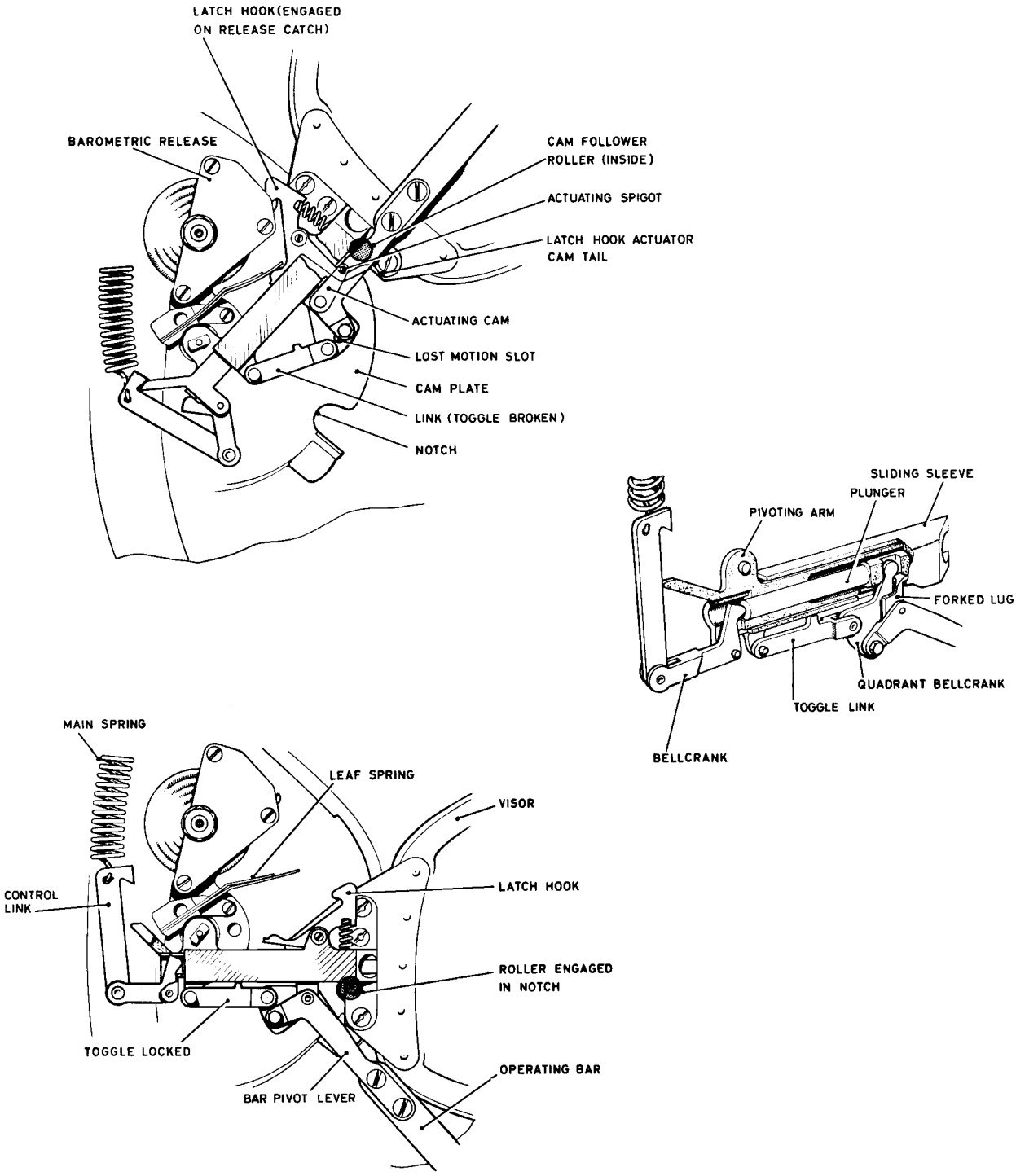


Fig. 10. Visor closing mechanism

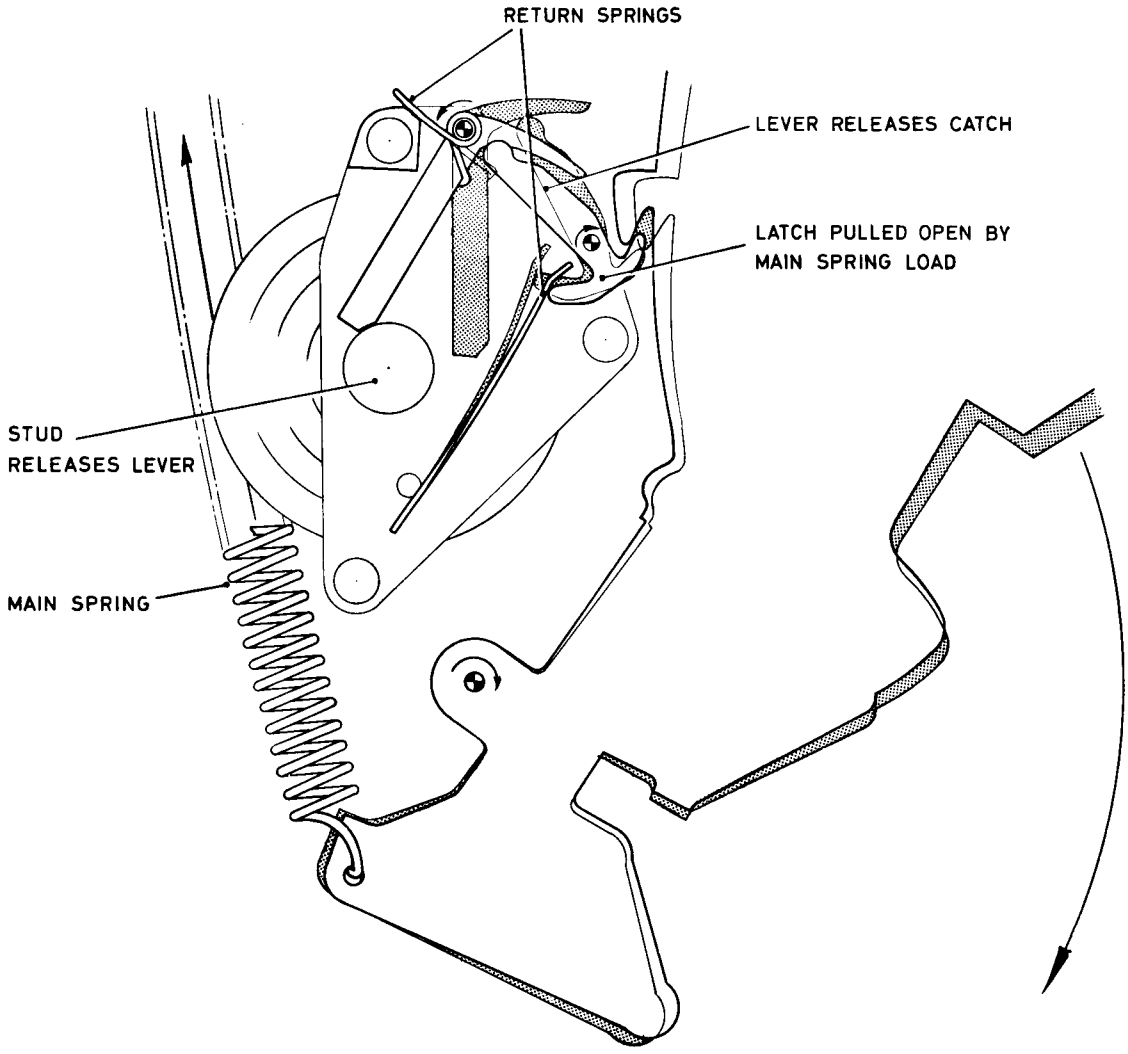


Fig. 11. Operation of barometric release

Fig. 12. Emergency rip-panel

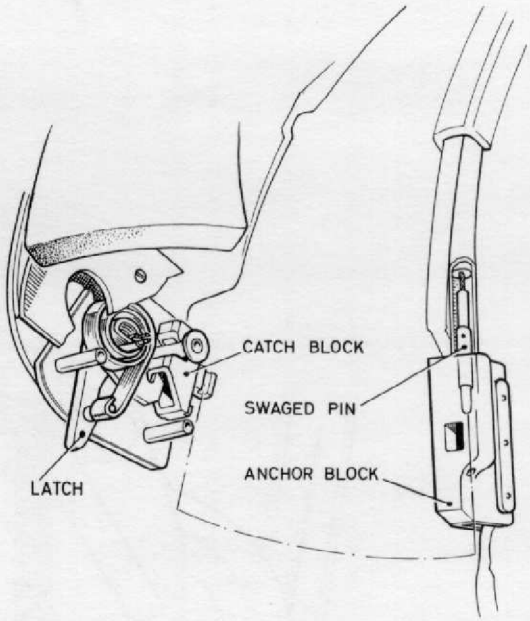


Fig. 13. Emergency rear shell release

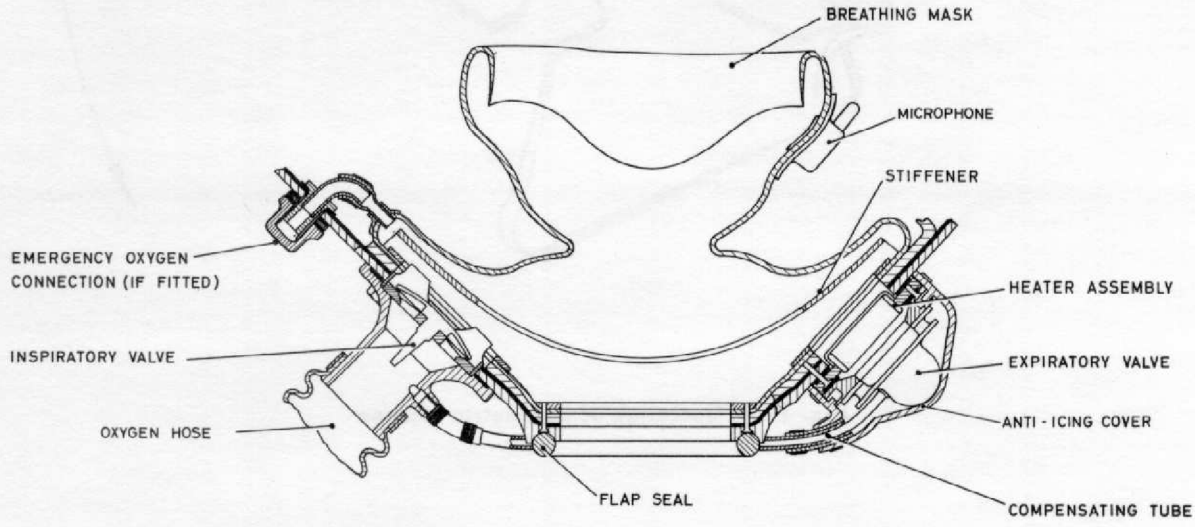


Fig. 14. Breathing valves

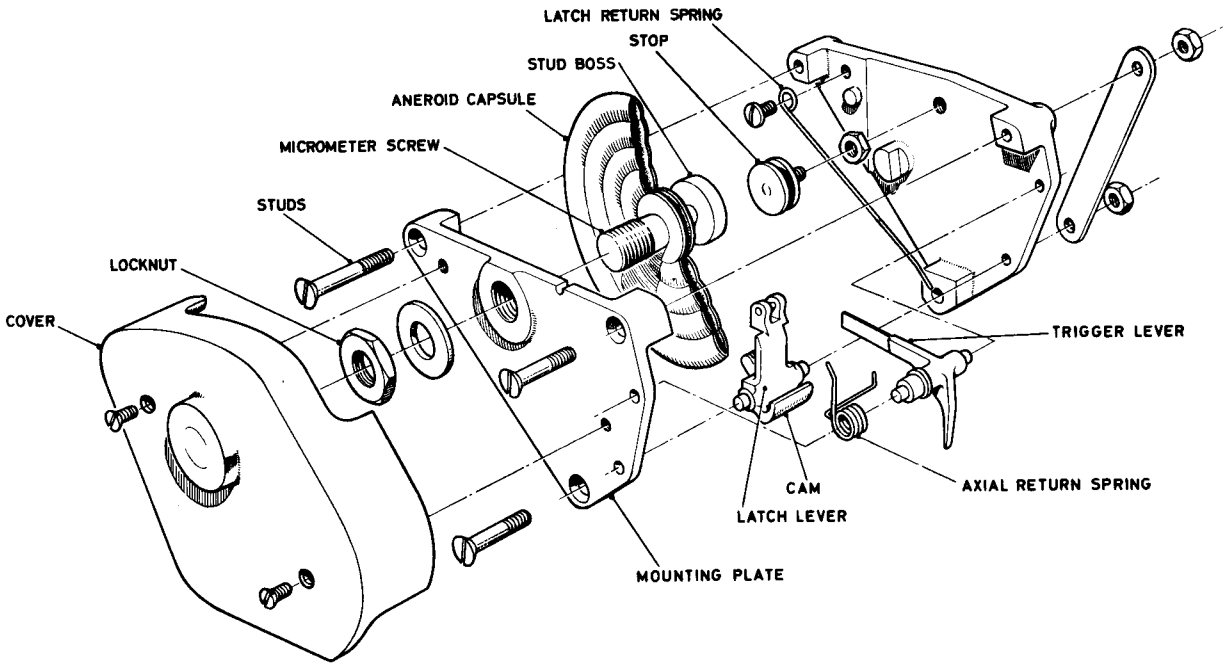


Fig. 15. Barometric release mechanism

SERVICING INSTRUCTIONS

CHECKING AND MAINTENANCE SCHEDULE FOR AIRCREW

Pre-flight checks with the helmet on

1. (1) Breathe in and out several times to exercise the valves. Breathe in, close the end of the inlet tube, and then breathe out again. If no increase in expiratory pressure resistance can be felt, both inspiratory and expiratory valves are functioning satisfactorily at room pressure. While performing this test, the corrugated inlet tube must not be stretched or compressed when breathing out or after closing the end.

(2) Close the end of the inlet tube and take a shallow breath. The oxygen mask should tend to collapse on the face. If it fails to do so, rectify by re-adjustment of the mask.

(3) Close the end of the outlet tube and breathe out lightly. The pressure should tend to lift the mask without outward leakage. If leakage is occurring it will be felt as a draught towards the eyes, and should be rectified by re-adjustment as in test 2.

(4) Carry out the routine functional check of the helmet intercommunication system in the aircraft before take-off.

Checks using the aircraft equipment

2. The oxygen mask can be checked as in test 3 by operating the 'safety pressure' control of the aircraft oxygen regulator. Similarly a pressurisation check can be carried out by operating the 'test pressure' control of the regulator. No subjective leakage or discomfort should be apparent.

WARNING

A counter pressure suit or jerkin must always be worn when carrying out a pressurisation check.

After flight

3. (1) Remove the inner liner for laundering.

(2) Wipe out the rubber pressure bag and oxygen mask with a damp cloth to remove condensation and perspiration.

(3) Carefully dry out the helmet interior, if necessary, with a heated blower or drying cabinet. Lightly powder all rubber parts using French chalk or talc. Care must be exercised to ensure that the breathing valves do not become contaminated.

4. After use the helmet should be passed on for periodic servicing (para. 5) and stowage. The helmet must be stowed in the case provided or in a similar *closed* container. If the helmet will be out of use for a period longer than one week the pressure visor should be locked in the open position to relieve the pressure on the tube seal. (See also para. 10).

PERIODIC SERVICING AND TESTING SCHEDULE FOR MAINTENANCE PERSONNEL

Note . . .

Servicing and Maintenance checks should be carried out using the M.L. Aircrew Equipment Test Unit. This unit is specially designed and manufactured for testing helmets, masks, suits, jerkins, etc. and the instruction manual supplied contains full details of procedures and methods of carrying out tests.

DAILY

5. The following checks and servicing instructions apply when the helmet is in continuous use, or prior to use when in intermittent service. They are not necessary when the helmet is in store. Note special instructions, however, when the helmet is stored for a longer period than one week (para. 10).

(1) Check for obvious signs of damage and wear and tear. Check for the security of all items.

(2) Operate the pressure visor, the anti-glare visor, the mouth access flap and the rear shell, when fitted, to check for correct functioning.

(3) Install a freshly laundered inner liner.

(4) Apply Lissapol very sparingly to the inside face of the pressure visor. Immediately after application wipe lightly with a cloth free of fluff or abrasive matter.

WEEKLY

6. The following checks and servicing instructions apply when the helmet is in continuous use, or prior to use when in intermittent service. They are not necessary when the helmet is in store. Note special instructions, however, when the helmet is stored for a longer period than one week (para. 10).

(1) Carry out all the checks as for daily servicing above.

(2) Check the mechanism of the mouth access flap as follows :–

(a) With the visor in the open position simultaneously squeeze both press buttons on either side of the mouth access flap. The flap should spring open and remain open.

(b) Close the flap again. Press each button separately. The flap should remain locked.

(c) Open the flap again. Release the pressure visor. The visor operating bar should knock the flap shut and it should remain locked.

(3) Check the valve heater, using the 22/28 volts D.C. supply. The current consumption should not exceed 0.31 amps and should not be less than 0.20 amps.

(4) Check the helmet intercommunication system for function and open and short-circuit conditions.

(5) Wearing the helmet with the visor open, connect the expiratory valve outlet to a nitrogen analyser and connect the oxygen inlet hose to a demand regulator set at 100% oxygen. As normal respiration proceeds the exhaled nitrogen content must fall to a value below 5%.

(6) Wearing the helmet with the visor open, connect the oxygen inlet hose to a low-pressure source incorporating leakage indication. Set the inlet pressure to 2 in. W.G. (3.5 mm/Hg) and, whilst holding breath, check that the leakage does not exceed 2 litres per minute.

(7) With the inner liner removed for convenience, properly mount the helmet on a dummy head of correct size and connect the oxygen inlet hose to a pressure source incorporating leakage indication. Pressurise the helmet to 1¼ and 2¼ lb/in.^{2} (65 and 115 mm/Hg) and check that the leakage rate does not exceed 10 litres per minute.

Note . . .

On certain Marks of helmet the ear-pads are pressurised by means of two flexible tubes protruding forward

through the pads into the space formed between the inner and outer linings of the pressure bag. If the leakage rate is excessive, plug the open ends of these tubes with suitable wedge-shaped rubber, or wood, plugs. Remove after completion of test.

(8) If desired the above check may be carried out wearing the helmet, properly fitted and in conjunction with a counter-pressure suit or jerkin. In this case the inlet pressure should be limited to 1¼ lb/in^2 (65 mm/Hg) and the leakage rate – allowing for the additional suit and hose connections – should not exceed 15 litres per minute.

MONTHLY

7. The following applies when the helmet is in continuous use or in store.

(1) Carry out all the checks specified for the daily and weekly periods. All these checks must be carried out even if the helmet is in store.

Note . . .

The actual setting of the barometric release capsule varies with different Marks of helmet but, in general, the visor should always be closed above an altitude of 40,500 ft.

(2) Place the helmet, with the visor open, in a chamber having a vacuum source and simulated altitude indication. Evacuate the chamber until the internal pressure corresponds to the specified setting of the barometric release capsule – tolerance, plus or minus 1,500 ft. The visor must close and lock in the closed position.

(3) Remove and service both the inspiratory and expiratory valves (para. 25 and 26). Provided both these items are functioning satisfactorily this operation may be carried over to the three monthly period.

EVERY THREE MONTHS

8. The following applies when the helmet is in continuous use or in store.

(1) Carry out all checks specified in the monthly period – the vacuum chamber test should not be performed until after the pressure visor glazing has been examined as described in (2) below.

(2) If the optical qualities of the pressure visor have become impaired, dismantle and clean, removing dust from the inner surfaces of the glazings. If the outer glazing is badly scratched it should be renewed. If desired the complete visor mechanism can be removed from the pivots.

(3) After re-assembly carry out the vacuum chamber test as specified in item 2 of the monthly period instructions.

(4) With the inner liner removed for convenience, properly mount the helmet on a dummy head of correct size and connect the oxygen inlet hose to a pressure source incorporating leakage indication. Pressurise the helmet to 4 lb/in^2 (205 mm/Hg) – proof test pressure – for approximately 30 seconds. Check that the leakage rate does not exceed 15 litres per minute.

Note . . . *(See also Note para. 6 (7))*

Before pressurising to the proof test pressure, remove the expiratory valve from the helmet and blank off the aperture, otherwise the valve diaphragm may sustain damage and subsequently give rise to an excessive leak.

(5) Grease the whole of the visor mechanism sparingly with anti-freeze grease. Use anti-freeze oil only on the barometric release mechanism.

(6) Whilst wearing the helmet, operate the emergency release knob and check for correct functioning of the rip-panel, condition and positioning of eyelet pins and cord. Re-stitch the cord to the nylon back-piece. On the Mark 4 helmet

check, in addition, that the swaged pins have withdrawn, disengaging the catch blocks and allowing the rear shell to swing free. Reposition the catch blocks in the anchor blocks and fully engage the swaged pins, (see fig. 13). Re-stitch the cord to the nylon back-piece at the cable link position. All tack-stitching to consist of two turns of No. 40 thread.

EVERY TWELVE MONTHS

9. The following applies when in continuous use or in store.

(1) Carry out all checks specified in the three monthly period.

(2) Examine carefully the pressure bag, tube seal, mouth access flap seal, oxygen mask and other rubber items If any deterioration of these items is apparent they should be renewed.

(3) If these items are considered fit for further service after the one year period they should now be given a three monthly inspection as specified in (2) above and renewed accordingly.

STORAGE, LONGER THAN ONE WEEK

10. If the helmet is to be stored for a period longer than one week special precautions must be observed to preserve the tube seal around the pressure visor. To prevent this tube being compressed for long periods the pressure visor should be stowed in the open position.

11. When out of use for either long or short periods the visor should always be kept covered with the fabric cover and the helmet should be stowed in the case in a cool, dry atmosphere. The rubber parts should not be exposed to daylight or direct sunlight for longer than necessary.

SERVICING, REPAIR AND REPLACEMENT INSTRUCTIONS

Cracked main and rear shells

12. Large depressed fractures should be referred back to the manufacturers before any attempt is made to repair. Minor cracks around the beading and elsewhere may be repaired as follows:–

(1) Remove the paint around the area of the crack with fine glass paper and expose the fibreglass.

(2) File the crack into a V form to ensure a good key-in for the repair.

(3) Make up a plastic dough for effecting the repair and store in a waxed cardboard container in readiness for use. The plastic dough is made up with Crystic Resin 302 and Tyglass woven rovings trimmed into pieces approximately ⅛ inch long. The Crystic Resin 302 is made up in the following proportions:–

'Parts by Weight' mix:–

100 P.B.W. Crystic 302 resin, 4 P.B.W. Catalyst Paste H, 2 P.B.W. Crystic Pregel 17, and 4 P.B.W. white pigment B213. Stir well and then add 1 to 4 P.B.W. Accelerator E, the amount of accelerator depending upon ambient temperature. *

(4) Work the plastic dough into the prepared crack so that it is standing slightly above the surrounding area.

(5) Allow the plastic material to cure. The curing and setting time of the mixed resin is approximately two hours at 68°F. minimum. The application of warm air by using, for example, a hair dryer, will reduce the curing time if necessary.

(6) Smooth down the repaired portion until level with the original surface and finish the surface using a rotary file, fine glass paper, etc.

(7) Re-paint the repaired area, using white primer filler SL5846 with Catalyst CSL5538 and white polyurethane gloss 2SH057 with Catalyst CSH 18. *

Damaged outer glazing on visor

13. The affected glazing must be renewed as follows:–

(1) Remove the sixteen screws which attach the glazing to the spacer and remove the damaged glazing.

(2) Position a new perspex blank over the spacer and cut away at the edges to clear the spreader plates by comparing with the damaged glazing. Spot through visually for the fixing holes and drill 3/32 inch dia. countersinking to .154 inch dia. at 90° inclusive. Attach to the spacer using the existing screws, tightening down evenly. Do not use excessive force or tighten down 'dead hard'; this will cause local crazing and distortion of the glazing and damage to the threads in the spacer. Ensure that no dust is trapped between the glazings on assembly.

(3) After repair the visor should be tested for correct operation and given the pressurising test (Weekly, Test 7) and the vacuum chamber test (Monthly, Test 2).

Cracked inner glazing and/or spacer on visor

14. When the inner glazing and/or the spacer are affected, repair or replacement must be carried out by factory trained personnel only.

Faults in the visor operating mechanism

15. The mechanism should seldom need servicing other than occasional lubrication. Under extremely dirty or sandy conditions, however, gritty or abrasive matter may cause jamming

** Suppliers of these, and other approved materials mentioned, can be obtained on application to M. L. Aviation Co. Ltd.*

or binding of the sliders and plungers within the side arms. To free, the side arm mechanism may be dismantled as follows (see fig. 10):–

(1) Remove the pressure visor assembly from the helmet by removing the mechanism covers and screws, releasing the return springs and removing the visor pivot screws. Take care not to lose the small spacing collars. Retain all parts carefully for re-assembly.

(2) Disconnect the operating bar from the bar pivot levers and withdraw the taper pins from the left hand retaining collar and right hand actuating cam. With the visor assembly in the normal position, looking from the inside, these pins are withdrawn downwards.

(3) Remove the bar pivot levers. The toggle forward links can now be disconnected downwards.

(4) Draw the pivot arms backwards to the fullest extent and rotate in an anti-clockwise direction to unscrew from the sliders.

(5) The plungers may now be withdrawn forwards through the sidearms.

(6) For complete dismantling drop the sliders out through the slots in the sidearms.

(7) After dismantling each part should be carefully labelled to ensure re-assembly with its correct mating part and on the correct side of the helmet.

(8) Wash each part in gasoline taking care to remove all traces of grease and grit.

(9) Examine each part for wear and the plungers, sliders and sidearms for signs of scoring. Any doubtful parts should be renewed.

(10) Lightly grease all moving parts, paying particular attention to the sliding items such as the plungers, sliders and sidearms. Use Antifreeze grease D.T.D. 577.

(11) Re-assemble in reverse order to dismantling. Note the following:–

(a) The chamfer on the plunger slot must face downwards to accept the disc end of the toggle forward link.

(b) When re-assembling the pivot arms to the slider the correct dimension of the cover fixing holes must be maintained at 1.56 inch horizontal centres to permit the re-fixing of the cover screws. Lock the cover screws in position using Heldite or similar compound to D.T.D. 777.

(c) Ensure the renewed taper pins are adequately locked after assembly.

(d) Remember to fit the pivot screw spacing collars.

(12) After re-assembly the visor should be tested for correct operation and given the pressurising test (Weekly, Test 7) and the vacuum chamber test (Monthly, Test 2).

Distorted mouth access flap, broken spring, etc.

16. To renew the flap, spring, hinge pins etc., proceed as follows :–

(1) Latch the pressure visor in the open position.

(2) Release the mouth flap catch by pressing both catch buttons simultaneously.

(3) Unscrew the hinge pin and remove both the flap and the spring.

(4) Renew worn or damaged items as required. If necessary, de-burr the end of the pin on the mouth flap very lightly.

(5) Lock the hinge pin on assembly with Heldite or similar compound to D.T.D. 777.

(6) After re-assembly the mouth access flap should be tested for correct functioning and should be given the inward leakage test (nitrogen content – Weekly, Test 5) and the pressurisation test (Weekly, Test 7).

Failure of the mouth flap catch

17. Failure of the mouth flap catch is usually associated with excessive wear of the catch plunger, catch pin and flap. Fatigue of the return springs may cause faulty operation but this fault is rare. Procedure for correction is to expose the mechanism and examine for wear as follows:—

(1) Remove the two screws securing the catch cover to the body and remove the cover.

(2) Take out the plungers and springs and examine for wear. Renew parts if necessary.

(3) Grease the mechanism lightly with anti-freeze grease D.T.D. 577.

(4) Re-assemble the catch cover and screws. Lock the screws in position with Heldite or similar compound to D.T.D. 777.

(5) If the pin on the mouth flap is suspected a new flap should be fitted as described in para. 16.

(6) After repair, test for correct functioning as specified in para. 16, item 6.

Checking and remedying leakage

18. The following describes the procedure to be adopted if, after the helmet is subjected to a test pressure of 115 mm. Hg., the leakage rate is found to exceed the specified 10 litres per minute. With the helmet on the dummy head and pressurised to the test pressure of 115 mm. Hg:— See also Note para. 6 (7).

(1) Check that the pressure-bag face seal is properly tensioned on the dummy head. (This sometimes gives rise to an apparent leakage which would not be present on a live subject).

(2) Check the helmet all over for leaks using a soap and water solution where necessary.

(3) Check for leakage at the expiratory valve and renew this item if faulty.

(4) Check carefully for leakage of the pressure visor and fit a new tube seal if necessary. If the outer glazing on the pressure visor has been removed or renewed, over-tightening of the fixing screws may cause serious distortion of the whole visor thus preventing proper sealing contact with the tube seal. Slacken off the screws evenly and in a diagonal order to relieve any stresses.

Expiratory valve heater fault

19. If the expiratory valve heater does not satisfy the requirements of the tests specified in the maintenance instructions it should be renewed as follows (see fig. 14):—

(1) Remove the expiratory valve cover from the valve by releasing the securing clip and unwinding the whipping which secures the cover to the sleeve over the plastic compensating tube.

(2) Remove the expiratory valve from the heater assembly by unscrewing eight 10 B.A. retaining screws and disconnecting from the compensating tube.

(3) Remove the sealing washer.

(4) Remove the heater assembly from the shell by unscrewing eight 10 B.A. retaining screws. These screws are a different length from those attaching the expiratory valve to the heater assembly as described in (2) above and must be kept separate for re-assembly. The retaining ring will now fall free into the mask duct enabling it to be removed.

(5) To free the heater assembly completely from the shell, the connecting wires must be released from the tack stitching and withdrawn. Take care not to cut the threads that secure the nylon backpiece to the shell.

(6) Remove the second sealing washer.

(7) Using new sealing washers re-assemble the new heater assembly to the shell using the retaining ring on the inside of the mask duct. Tighten the eight 10 B.A. retaining screws evenly to avoid distortion.

(8) Tack stitch the wires to the shell using whipping cord, 3 cord/No. 18S/3, Spec. 3F 34.

(9) Re-assemble the valve to the heater assembly in the reverse order utilising a new securing clip for the cover if necessary.

(10) Attach the cover to the compensating tube with whipping cord, 3 cord/ No. 18S/3, Spec. 3F 34. Renew the sleeve if necessary before whipping.

(11) Varnish the new whipping all over.

(12) After re-assembly test for correct functioning by performing tests for the valve heater (Weekly, Test 3), nitrogen analysis (Weekly, Test 5) and leakage (Weekly, Test 7).

Faults in the intercom system

20. A fault in the intercom system may be detected by means of the R.T. tester (Weekly, Test 4), or conventional electrical methods. To renew various items in the circuit, proceed as follows :–

(a) Renewing the wiring harness.

(1) Remove the helmet liner.

(2) Remove the rubber patches inside the earpiece of the pressure bag. Great care must be exercised during this operation.

(3) Push the earphones out from the rear of the housings and disconnect the cable loom.

(4) Push the microphone from its housing in the oxygen mask and disconnect the cable loom.

(5) Lift the edge of the rubber pressure bag directly under the microphone switch (when fitted). Lift the rim of the rubber mushroom around the switch and disconnect the cable loom.

(6) Withdraw the cable loom. A solution of soap and water should be used to ease the sealing beads through the ducts.

(7) By removing the whipping on the outside and drawing the loom through the slit in the nylon backpiece the entire harness may now be removed from the helmet.

(8) To fit a new harness re-assemble in the reverse order to the above, re-sticking the mushroom and pressure bag around the microphone switch (when fitted). The adhesives should be used as follows :–

(a) Prime the fibreglass surface with Boscolite primer 9252 and allow to dry until it becomes transparent.

(b) Apply Boscotex primer No. 5R and allow to dry (drying can be accelerated by careful use of a heated blower).

(c) Cement the surfaces together with Boscoprene cements A and B 525 in equal proportions.

(9) Stick new patches inside the earpieces similarly.

(10) Re-whip the harness to the tab on the nylon backpiece using cord, 3 cord/ No. 18S/3, Spec. 3F 34. Varnish the whipping on completion.

(11) All the connection screws are to be locked with Varnish V130/1 around the heads only.

(12) After the above replacement has been carried out perform tests for nitrogen analysis (Weekly, Test 5) and leakage (Weekly, Test 7).

(b) Renewing the earphones

(1) Repeat operations 1, 2, 3 and 4 as for harness replacement.

(2) Re-assemble the new components in the reverse order to removal, locking the connection screws around the heads only, with varnish V130/1.

(3) Stitch down the new patches inside the earpieces as in harness replacement operation 8.

(c) Renewing the microphone

(1) Proceed as in operation 4 of the harness replacement instructions.

(2) Re-assemble the new components and lock the connection screws around the heads only with varnish V130/1.

(d) Microphone switch (when fitted)

The components of this item can all be removed and replaced or renewed as required, except the main body which is moulded into the shell.

Excessive inwards leakage

21. Excessive inwards leakage is revealed by the nitrogen analysis test (Weekly, Test 5). If, after the meter on the Nitrogen Analyser has been given time to settle down and breathing has been in progress for some minutes, the nitrogen content shows greater than 5%, proceed as follows:—

(1) Test for valve leakage, particularly of the expiratory valve, and renew the valve if necessary.

(2) Test for leakage of the mouth access flap and correct accordingly.

Servicing the barometric release mechanism

22. No attempt should be made to dismantle this mechanism. To examine and oil, proceed as follows:—

(1) Remove the two securing screws from the cover and remove the cover to expose the mechanism (see figs. 11 and 15).

(2) If, on examination, the aneroid capsule appears damaged or distorted it requires replacing with a new capsule. This operation involves the complete removal of the visor and barometric assemblies and should be undertaken by factory trained personnel only.

(3) If the mechanism is functioning correctly, oil the pivot bearings in the side plates lightly with anti-freeze oil D.T.D. 417.

(4) If it is desired to alter the altitude setting. Carefully slacken the lock-nut and adjust the setting by rotating the capsule, as indicated. Subsequently re-tighten the lock-nut. It is essential to avoid straining or distorting the capsule during this operation.

(5) Test the operation of the barometric release in the vacuum chamber as for Monthly Test 2.

Cleaning the pressure visor

23. (1) If necessary, remove the outer glazing (see para. 13). Use a soft camel hair brush to brush out the space between the glazings. Lightly wipe over the optical areas with a cloth free from fluff and abrasive matter.

(2) Light scratches may be removed using No. 2 Perspex polish.

(3) Give vacuum chamber test (Monthly, Test 2) and pressurising Test (Weekly, Test 7).

Cleaning the anti-glare visor

24. (1) Remove dust with a camel hair brush.

(2) If necessary polish with No. 2 Perspex polish.

Servicing and changing the expiratory valve

25. (1) Remove the valve from the heater assembly as described in para. 19. On no account press down the valve disc with the fingers.

(2) Using a source of cool dry air, blow through the valve with a very light pressure to remove all dust and foreign matter. Any stubborn particles may be removed using a good quality camel hair brush. If a single hair can be seen anywhere on or near the valve after cleaning it must be removed with instrument forceps.

(3) Re-assemble in the reverse order. It is advisable to use a new sealing washer.

(4) Re-whip the cover to the compensating tube using cord, 3 cord/No. 18S/3, Spec. 3F 34. Varnish over.

(5) Perform nitrogen analysis (Weekly, Test 5) and leakage Tests (Weekly, Test 7).

Servicing and changing the inspiratory valve

26. (1) Remove the oxygen tube from the oxygen connector assembly by pulling back the rubber band and releasing the clip (see fig. 14).

(2) Remove the oxygen connector assembly by unwinding the whipping cord securing the assembly to the compensating tube and sleeve and then removing the six 8 B.A. nuts securing the assembly to the shell. The retaining ring may fall into the mask duct and should be recovered.

(3) Remove the sealing washer.

(4) Using a source of cool dry air blow through the valve with a very light pressure to remove all dust and foreign matter. Any stubborn particles may be removed using a good quality camel hair brush. If a single hair can be seen anywhere on or near the valve after cleaning it should be removed with instrument forceps.

(5) On no account remove the rubber mushroom valve from its seating.

(6) Re-assemble in the reverse order using a new sealing washer.

(7) Ensure that the compensating tube is clear and re-whip to the assembly using cord, 3 cord/No. 18S/3, Spec. 3F 34. Varnish over.

(8) Inspect the oxygen tube for defects and renew if necessary. Re-connect the assembly using a new clip if necessary.

(9) Perform nitrogen analysis (Weekly, Test 5).

Damage to the pressure bag

27. Replacement and repair is beyond the scope of normal servicing and should be carried out by factory trained personnel only.

Changing the pressure visor tube seal

28. (1) Latch the pressure visor in the open position.

(2) Carefully strip out the old tube seal, paying particular attention to the four connecting ducts communicating with the interior of the helmet. The lowermost of these ducts have mushroom-shaped terminations which must be removed from the shell.

(3) Clean out the tube seal track with Bostik cleaner No. 6001. Clean also the four duct holes and the area of the mushroom terminations, removing all traces of old adhesives, tube seal etc.

(4) Re-prime the tube seal track, roughen the mating face of the new tube seal with fine glass paper and stick the seal into the track using Boscolite Primer 9252, Boscotex Primer No. 5R and Boscoprene cements A and B 525. The new tube seal has four mushroom shaped terminations – one for each connecting duct. The upper two terminations must be trimmed off to leave the ducts flush with the inside of the facepiece; the lower two terminations should be glued down as before.

(5) Allow time for the adhesives to dry and then carry out leakage test (Weekly, Test 7).

Changing the mouth access flap seal

29. (1) Latch the pressure visor in the open position.

(2) Release the mouth flap and allow to remain in the open position.

(3) Carefully strip out the old seal.

(4) Clean out the seal track using Bostik cleaner No. 6001, removing all traces of the old seal and adhesives.

(5) Re-prime the seal track, roughen the mating face of the new seal with fine glass paper and stick the new seal into the track using Boscolite primer etc. as in para. 28, operation 4.

(6) Allow time for the adhesives to dry and carry out nitrogen analysis and leakage tests (Weekly, Tests 5 and 7).

Changing the oxygen mask assembly

30. (1) Remove the expiratory and inspiratory valves as described in paras. 19 and 26.

(2) Open the mouth flap and strip out the seal. Clean out the seal track using Bostik cleaner No. 6001 to expose the screws securing the clamp ring on the inside of the mask assembly.

(3) Remove the screws and ring.

(4) Remove the plastic mask duct withdrawing it through the flap aperture.

(5) Remove the microphone and disconnect and remove the cable loom as described in para. 20.

(6) The oxygen mask may now be collapsed and passed through the hole in the suspension ring and the complete assembly removed.

(7) Re-assemble in the reverse order using a new mask assembly, valve sealing washers and mouth flap seal. See instructions under para. 29 for renewal of mouth flap seal.

(8) Carry out nitrogen analysis and leakage tests (Weekly, Tests 5 and 7).

MARK 4 HELMET ONLY :–

Servicing the rear latch assembly

31. The mechanism should seldom need servicing other than occasional lubrication. To renew a broken spring, etc; proceed as follows :–

(1) Carefully peel back the corner of the padding to expose the mechanism inner plate.

(2) Remove the inner plate by removing the circlip and unscrewing the five retaining screws.

(3) Renew broken spring, etc; as required.

(4) After re-assembling stick the padding back into position with an impact adhesive (Evostick).

(5) If the mechanism is functioning correctly, lightly grease the moving parts with Antifreeze grease D.T.D. 577.

Replacing broken or weak hinge spring

32. (1) Remove a circlip from one end of the hinge pin and withdraw the pin from the attachment lugs.

(2) Remove the broken or weak spring, easing the padding away locally as necessary.

(3) When re-assembling, use a new circlip and do not forget the spring mounting tube. Re-stick the padding, as necessary.

Damaged emergency release cable

33. Should the release cable become kinked, resulting in the swaged pins not locking fully home, or some other malfunction occur, the release cable and conduit assembly may be replaced, as follows (see fig. 13):–

(1) Carefully remove the padding located at the top of the main shell.

(2) Disconnect the emergency rip-cord from the release cable and remove the guide eyelet from the fabric backpiece, marking its position for future reference.

(3) Pull the release cable to release the two catch blocks. (The tack-stitches will break).

(4) Remove the two bolts and nuts securing the conduit to the main shell and remove the release cable and conduit assembly. Ease the assembly upward and forward into the main shell dome in order to clear the conduit ends from the anchor blocks. It may be necessary to slacken the screws clamping the anchor blocks to the shell to take advantage of the slotted adjustment. In this case the adjustment position should be marked for future reference.

(5) Insert the new release cable and conduit assembly and, simultaneously, secure the two loose catch blocks. The catch blocks are not interchangeable and must be correctly positioned (see fig. 13). Fasten the assembly to the shell with the two bolts and nuts, passing respectively through cover, shell, hinge clip and conduit lug.

(6) Knot and re-whip the emergency rip-cord to the release cable ferrule and stitch the release cable guide eyelet to the fabric backpiece. Use 3 cord/No. 18S/3, Spec. 3F 34.

(7) Stick the padding back into position using an impact adhesive (Evostick).

(8) Adjust the position of the anchor blocks, if necessary, to give correct functioning of the latch releases Re-tighten the clamping screws.

(9) Carry out the emergency release test (Three Monthly Test 6). Re-insert the tack-stitches securing the release cable to the conduit, using two turns of No. 40 thread.

APPENDIX 1

ADJUSTMENTS TO THE HELMET

1. The M.L. Helmet is manufactured in two basic sizes: Size 1 (Small) and Size 2 (Large). Whenever possible the size is selected by reference to the information contained on a Personal Measurement Chart (Appendix 3) and the helmet is fitted and adjusted by factory trained staff of the M.L. Aviation Company.

2. When properly donned and fitted, as instructed in para. 13, the helmet should function correctly and be comfortable. Should some discomfort or lack of sealing be experienced, the following checks and adjustments are permissible.

3. Helmet feels unduly tight or generally small:–

(1) Check size of helmet.

(2) Ensure that the head lacing is correctly adjusted (see fig. 9B).

(3) Carefully trim the edges of the face seal around the eyes, tapering past the corners of the mouth, so that the lower edge of the face seal is positioned on the point of the chin (see figs. 7B and 7D). It is not advisable to trim over the brow. *In order to allow for stretching of the rubber seal do not cut more than ⅛ in. at each trial fit.* The adjustment of the seal permits the head to go farther forward into the helmet but the amount of trim is limited by the fact that the mask must not be pressed against the shell.

(4) Should undue pressure be felt on the cheeks or on the upper lip when the mask straps are correctly adjusted, the internal bar of the mask may be removed. *The inside sealing edge of the mask must not be trimmed.*

(5) Should undue pressure be felt on the sides of the chin it may be necessary to reduce slightly the thickness of the internal spacing blocks (fig. 7D) by peeling off one layer, or by peeling off one layer from the head padding (see fig. 8A).

(6) Although not normally necessary, the interior padding of the pressure-bag may be removed, completely or in part.

(7) If the leather face flap interferes with the field of vision, it should be trimmed back.

4. Helmet feels loose or too large:–

(1) Check size of helmet.

(2) Check the lacing adjustment (fig. 9B) and ensure that the bag overlap at the back is adequate (fig. 8B).

(3) Add extra head padding in the top of the helmet, as required (fig. 8A).

(4) Should undue pressure be felt at the bridge of the nose, increase the internal padding at the forehead position.

(5) Increase the thickness of the internal spacing blocks at the sides of the chin (fig. 7D).

(6) Although not normally necessary, extra padding may be added, as required, to the interior of the pressure-bag. Alternatively, the existing padding may be removed and a thicker padding substituted.

APPENDIX 2

VENTILATION ASSEMBLY

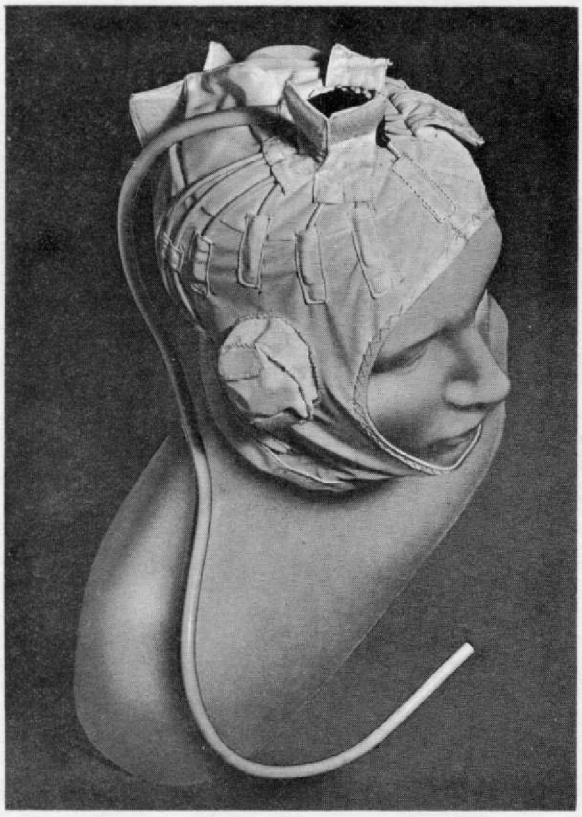


Fig. 1. Liner and tube assembly

Fig. 2. Ventilation assembly
(installed c/w barometric cut-off valve)

1. The ventilation assembly is available as an extra to the standard helmet, for use in adverse climatic conditions. It provides an efficient means of cooling, or heating, the head and neck for comfort under stand-by conditions on the ground and also when required during flight.

2. It consists of a special (pocketed) fabric inner helmet liner, a distribution tube assembly and a barometric cut-off valve (if required). The pocketed liner, supplied in two sizes, is interchangeable with the standard liner and can be separated from the distribution tube assembly for cleaning. Use of the barometric cut-off valve is optional; its purpose is to stop the flow of air at a pre-set altitude when ascending in flight. Alternatively, a manually operated valve can be inserted in the personal air supply line.

3. The pocketed liner and distribution tube assembly are assembled together as follows (fig. 1):–

(1) For convenience, fit the liner to a dummy head.

(2) Offer the tube assembly to the liner. Ascertain to which side of the helmet the intercom supply lead is fitted and arrange it so that the air supply line of the tube assembly is passed through the main securing loop of the liner on the opposite side. The tube assembly can be fitted either way up for this purpose.

(3) Insert the red coloured centre front tube into the pocket identified with red thread stitching.

(4) Working from the front, successively insert the remaining tubes through the loops (where applicable) into the appropriate pockets.

(5) Centralise the distribution box of the tube assembly and ensure that it is lying naturally and that all tubes are free from twist.

4. The ventilating assembly is fitted to the helmet, as follows (fig. 2):–

(1) Open rear shell, if fitted (Mk. 4 helmet). Open fabric backpiece of helmet and roll back to expose the pressure bag.

(2) Remove the standard liner and the additional top pads, if fitted, by unsealing the Velcro fasteners.

(3) Starting from the interior of the helmet, pass the free end of the air supply tube through the appropriate right-hand or left-hand tunnel located in the top fixed pad. Select the tunnel which is opposite to the intercom supply lead, see sub. para. (2) of para. 3.

(4) Continue by passing the tube successively through the appropriate loops attached to the inside of the fabric backpiece and finally through the pocket formed in the backpiece to give access to the exterior of the helmet. Draw the ventilation assembly into its approximate position with the pressure bag, ensuring that it is lying naturally and that the air supply tube is free from twist.

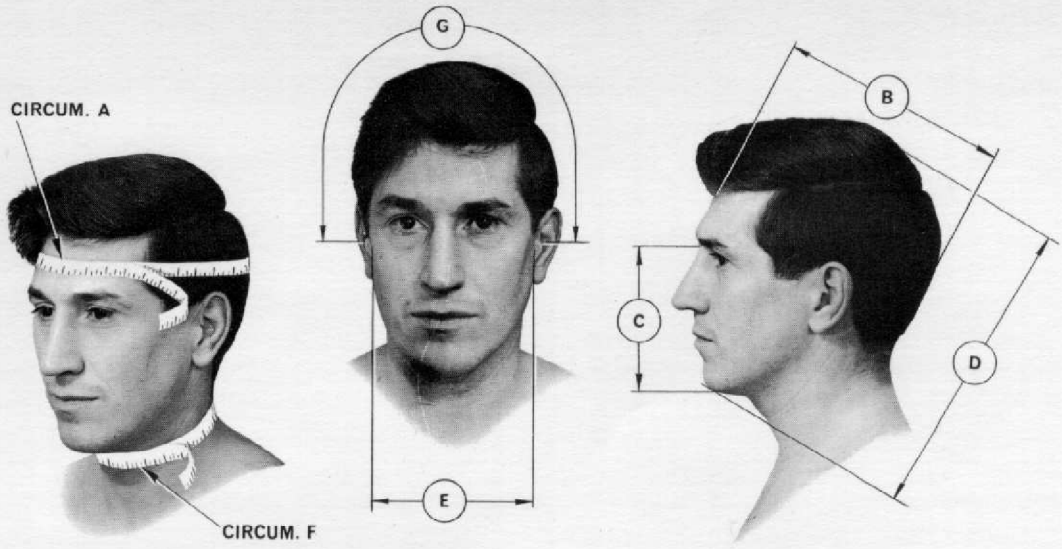
(5) Properly position the liner within the pressure bag, smooth out any excessive wrinkles and fasten the liner to the pressure bag by means of the Velcro fasteners.

(6) Replace any additional top pads that were removed. Pass the four tabs at the top of the liner through the hole in the pads and fasten them on their respective Velcro fasteners.

(7) Fit the barometric cut-off valve or manually operated valve, as required, to the air supply tube for subsequent connection to the suit ventilating system. If desired, the air supply tube can be fastened to the fabric backpiece by means of whipping cord.

(8) For removal of the ventilation assembly and breakdown for cleaning, etc: reverse the foregoing procedure.

PERSONAL MEASUREMENT CHART (LS2236-220D)



DIMENSION	LETTER	SIZE (in.) (mm)
Horizontal circumference	A	
Max. head depth	B	
Facial height	C	
Max. head length	D	
Head breadth	E	
Neck circumference	F	
Min. ear to ear distance Dimension over crown	G	

FLESH COVERING ON CHEEKS (Mark X as applicable)	NAME OF SUBJECT
Lean	
Medium	ADDRESS
Full	
Helmet No:	

DETACH THIS MEASUREMENT CHART & FORWARD TO M.L. AVIATION CO. LTD., WHITE WALTHAM, BERKSHIRE, ENGLAND.

BASED ON INSPECTION TO THE REQUIREMENTS OF FULL PRODUCTION TEST SCHEDULE LS2236-210

INSPECTION REPORT FOR PRESSURE HELMET

TYPE MK.	SERIAL No.	SIZE	G.A. No. ISSUE

PRESSURE TEST

Pressure P.S.I.	2.25					1.25					4.0	2.25	1.25
Test No.	1	2	3	4	5	6	7	8	9	10	11	12	13
Leakage L/M													

MASK LEAKAGE (USING 100% OXYGEN)

Head position	1	2	3	4	5
Inward leakage % Nitrogen					
Outward leakage at 2 inch Water Gauge L/M					

AUTOMATIC VISOR RELEASE

1013 Millibars (Datum)	1	2	3
Altitude (feet)			

MECHANICAL CHECKS

Shell and backpiece		Anti-glare visor	
Visor and mechanism		Pressure bag	
Barometric release		Oxygen mask	
Mouth access flap		Emergency release	
Breathing valves		Rear shell mechanism	

INTERCOM SYSTEM CHECKS

Microphone	Type	Impedance	ohms at 1,000 c/s	ohms D.C.R.	
Earphones	Type	Impedance	ohms at 1,000 c/s	ohms D.C.R.	

EXPIRATORY VALVE (HEATER)

Type	Heater current consumption			
Serial No.	22 volts	amps	28 volts	amps

REMARKS:

GENERAL

Helmet weight	
Carrying case	

INSPECTION FINAL CHECK

STAMP:

DATE: