Chapter 26

HELMET FLYING PROTECTIVE (ONE PIECE) MK. 3

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Introduction

1. The Helmet, Flying Protective (One piece) Mk. 3 takes the place of the flying helmet and the Helmet Protective Mk. 1A and provides the same facilities as these separate items in a single headpiece. It incorporates a Visor Mk. 2C with track and mechanism as fitted to the Helmet Protective Mk. 1A.

2. Three sizes of helmet are available, corresponding, approximately, to standard hat sizes:-

		Size	*Ref. No.*
(1)	Small	6½ in. to 6⅞ in.	22C/2326
(2)	Medium	6⅞ in. to 7¼ in.	22C/2327
(3)	Large	7¼ in. to 7⅝ in.	22C/2328

Adjustments are provided to suit individuals on initial fitting, which must be conducted under the supervision of a qualified aircrew equipment officer.

DESCRIPTION

Shell (*fig.* 1)

3. The helmet is constructed with a rigid outer shell of glass fibre resinate with locally formed lobes to accommodate the telephone receiver and microphone connector plug respectively. Shallow bosses are moulded on each side of the helmet in the region of the ears.

Cradle (*fig.* 2)

4. Inside, immediately under the crown, the helmet is padded with a layer of cork which is covered by a silk lining. Below this, a harness of nylon webbing forms a suspension cradle to keep the shell clear of the head and minimise any transmitted shock. The initial tension of this cradle is adjusted to suit the wearer by means of nylon cords, one controlling the front and the other the rear cross webbings. When satisfactorily adjusted the tensioning cords are locked in small exterior screw clamps on the left-hand side of the helmet.

Fig. 1 Helmet Flying Protective (one piece) Mk. 3

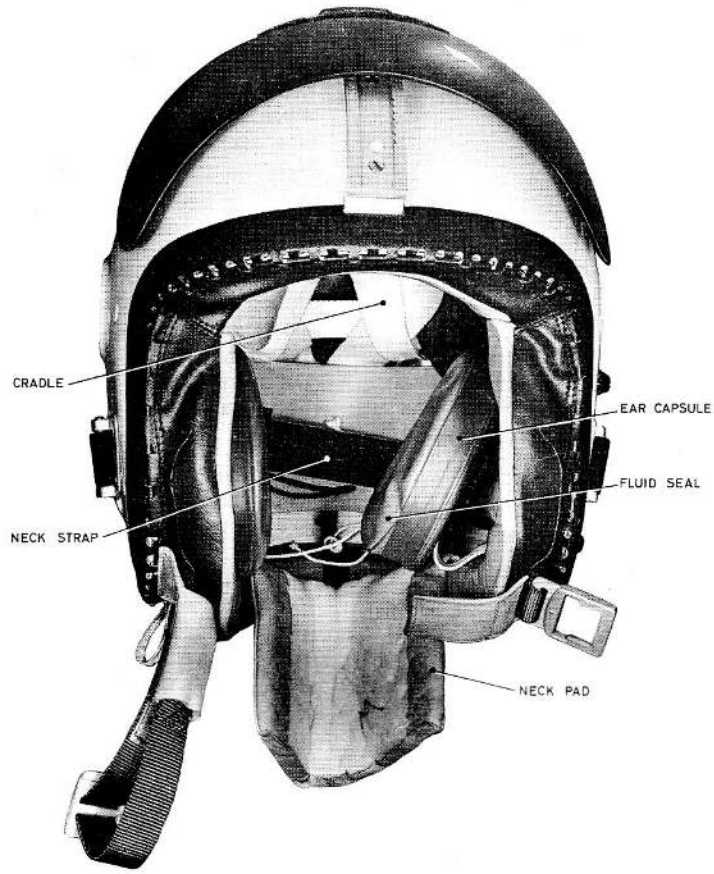

Fig. 2 Helmet Flying Protective (one piece) Mk. 3 Interior

Neck strap

5. Another adjustable strap is provided inside the helmet and passes behind a pad at the back of the head to embrace the nape of the neck. This strap is provided for longitudinal adjustment to suit the wearer. It is tensioned by external toggle buckles on either side of the helmet. When the toggle buckles are turned towards the rear, the neck strap is relaxed, enabling the helmet to be drawn comfortably over the head. After donning the helmet the toggle buckles are turned forward, tightening the strap around the back of the neck and pulling the helmet back so that the ears are in correct alignment with the telephone ear pads.

Lining

6. The lining of the helmet is removable and comprises sponge rubber padding covered with soft leather, shaped to form a seal round the face aperture. Leather covered flaps are provided at the forehead and the nape of the neck and behind the ear capsule recesses. The lining is laced to the helmet by a leather attachment strip around the edge. This strip has a castellated edge formed by loops or tunnels which mate with corresponding castellations formed in a leather strip cemented to the rim of the shell. The lace passes alternately through the loops of the helmet and loops on the lining and is tied at the back.

Chin strap

7. The chin strap is in two sections attached by screws to the rigid part of the helmet and passing through slots in the lining. It has a special quick-locking buckle and is adjustable in length. The loose end of the chin strap, after locking, is stowed by adhesion to a strip of 'Velcro' self-locking material on a leather tunnel attached to the lining.

Mic-tel assembly

8. The ear capsules are connected by acoustic tubes to a single miniature telephone Type 13775 installed in the lobe at the rear righthand side of the helmet and attached by stitching to the shell. The ear capsules are surrounded by fluid filled seals which are kept in close contact with the head by means of a wire spring suspension attached to the shell by screws. The capsules are slidable on wire frames for vertical adjustment.

9. The capsules are located at their lower ends by looped tapes engaged by a second nylon lace threaded through alternate tunnels of the castellated strip to which the lining is laced. These loops also serve to pull open the wire spring headset when donning the helmet.

10. The microphone connector plug is housed in a shaped aperture on the left-hand side of the helmet and is connected by internal cable to the telephone assembly. The connector is designed for the standard R.T. system and has a 'pigtail' terminating in a Plug, Jack (*Ref.* 22C/18575) which hangs from the back of the helmet.

Additional padding

11. An additional sponge rubber pad is provided behind the lining neck pad to cover the telephone assembly. It is held in place by threading the ends of the cord holding the intercom. pigtail through the holes provided in the pad and tying them. Another pad of the same material is cemented behind the top edge of the face aperture to space the helmet off the forehead. This pad can be removed or modified to suit the wearer on initial fitting.

Anti-glare screen, track and mechanism

12. The track and mechanism for a Visor Mk. 2C is attached to the front centre of the shell. Anti-glare screens are available in different sizes to suit the helmet, with a light or dark tint screen as preferred. Until required the screen is normally protected with a velveteen cover which should only be removed immediately prior to flight. Details of the Visor Mk. 2C will be found in A.P.1182E, Vol.1, Sect.1, Chap.14.

FITTING THE HELMET

13. The helmet should be fitted to the wearer initially by a qualified aircrew equipment worker. The basic size of the helmet should be chosen according to head measurement, adjustments are then made to suit the individual wearer. It is important that the fit is correct and comfortable and a careful selection should be made of the initial basic size.

14. There is a degree of overlap between the medium and the two other sizes. A person whose head size is on the top measurement of a basic size – say 6⅞ in. – should also try the next size up (medium in this case). Similarly, a head size on the bottom limit of the larger size – e.g. 7¼ in. – may be better off with the next size down (again medium). Generally speaking, a medium or short oval head shape is best suited with a smaller helmet and a long oval head with a larger.

15. To cover head sizes where the smaller helmet is tight longitudinally but the next size is too large, the forehead strip of sponge rubber padding can be removed. This should not be done, however, until the helmet has been properly adjusted and has been worn for a while.

Adjusting the cradle

16. To adjust the cradle proceed as follows:-

(1) Place the helmet on the head. The wearer should hold it in the desired position (*fig.* 3), while adjustments are made to the cradle harness. The top rim of the face aperture should be clear of the eyebrows and in such a position that it is just within the upward range of vision.

(2) With the wearer maintaining this position, slacken off the cable clamping screws on the left-hand side of the helmet.

(3) Adjust the front cross webbing by pulling on the rear adjustment cord with pliers, tightening the cradle to maintain the vertical position being held by the wearer. Tighten the clamping screw to grip the cord.

(4) Lift the helmet slightly and straighten it on the head. Fasten and moderately tighten the chin strap (see para. 19, operation 7).

(5) Slacken the front clamping screw, pulling on the cord until the cradle is felt to be bearing comfortably on top of the head.

(6) If not satisfactory on first adjustment, release the chin strap and re-adjust until the position is correct and the weight of the helmet is evenly supported by the cross webbing. Tighten the screws.

(7) If necessary raise or lower the ear capsules on their wire guides to align vertically with the ears.

Adjusting the neck strap

17. Adjustment of the neck strap is to be made so that when the toggle buckles are tensioned the helmet is drawn back with the ear capsules in horizontal alignment with the ears. When correctly adjusted the toggle buckles should present a noticeable resistance to being turned into the locked (forward) attitude and the wearer should be conscious of a slight pressure at the back of the head. To adjust the neck strap:-

Fig. 3 Fitting the helmet to the wearer

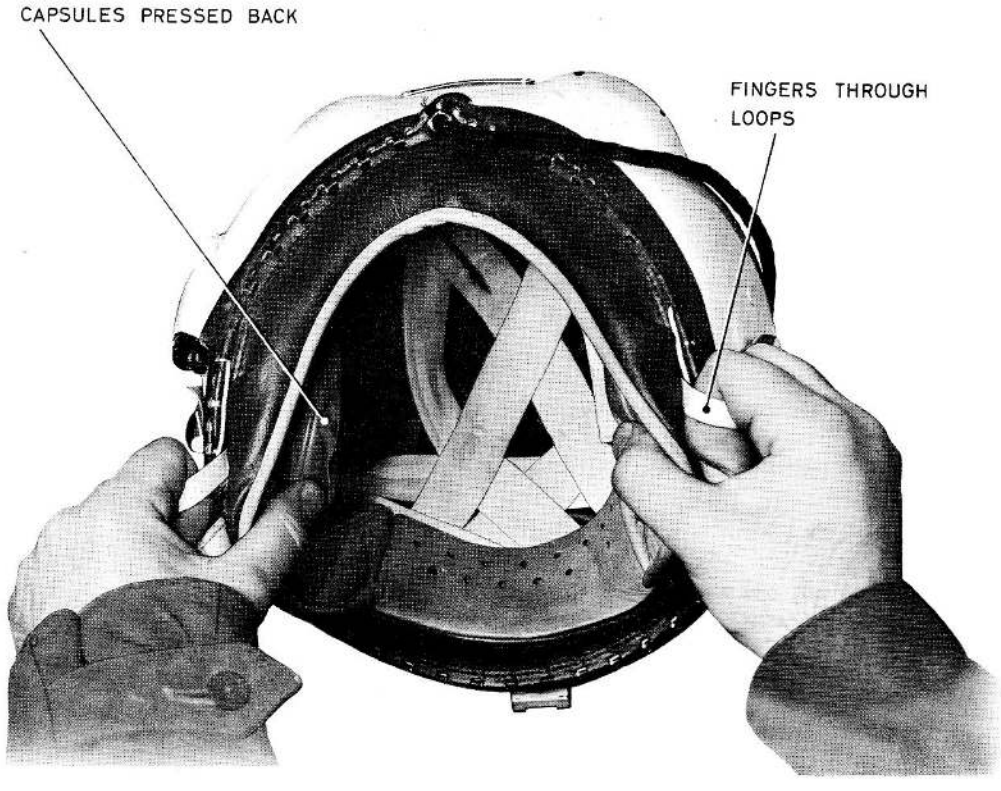

Fig. 4 Donning the helmet

(1) Remove the helmet.

(2) Pull down the leather lined neck pad (perforated) exposing the neck strap adjuster.

(3) Tighten or slacken the adjuster as required.

(4) Don the helmet again and test. Repeat these operations until a satisfactory fit is achieved.

18. After a minimum of two flying hours the fit of the helmet should be re-checked and adjustments made where necessary. When completely satisfactory lock the cradle adjustment screws with thread sealant. Trim off any surplus adjustment cord and heat seal the ends.

Donning the helmet (*fig.* 4)

19. After satisfactory initial adjustment of the helmet, it is to be donned as follows:-

(1) Ensure the neck strap toggle buckles are turned to the rear and the chin strap unfastened.

(2) Insert the forefinger of each hand through the white loops which project downwards below the rim of the helmet.

(3) Place the thumbs inside the helmet in contact with the rim of the ear capsule and press back firmly against the rigid sides of the helmet.

(4) Pull the helmet down over the top of the head with a downward and slightly rearward movement.

(5) Adjust the capsules to lie comfortably over the ears by pulling on the loops or by inserting the fingers between the face and the helmet lining. Take care not to damage the fluid seals surrounding the capsules.

(6) Turn the toggle buckles forward to tighten the neck strap. If correctly fitted beforehand this will draw the helmet back in correct alignment with the ears and tighten the helmet on the head.

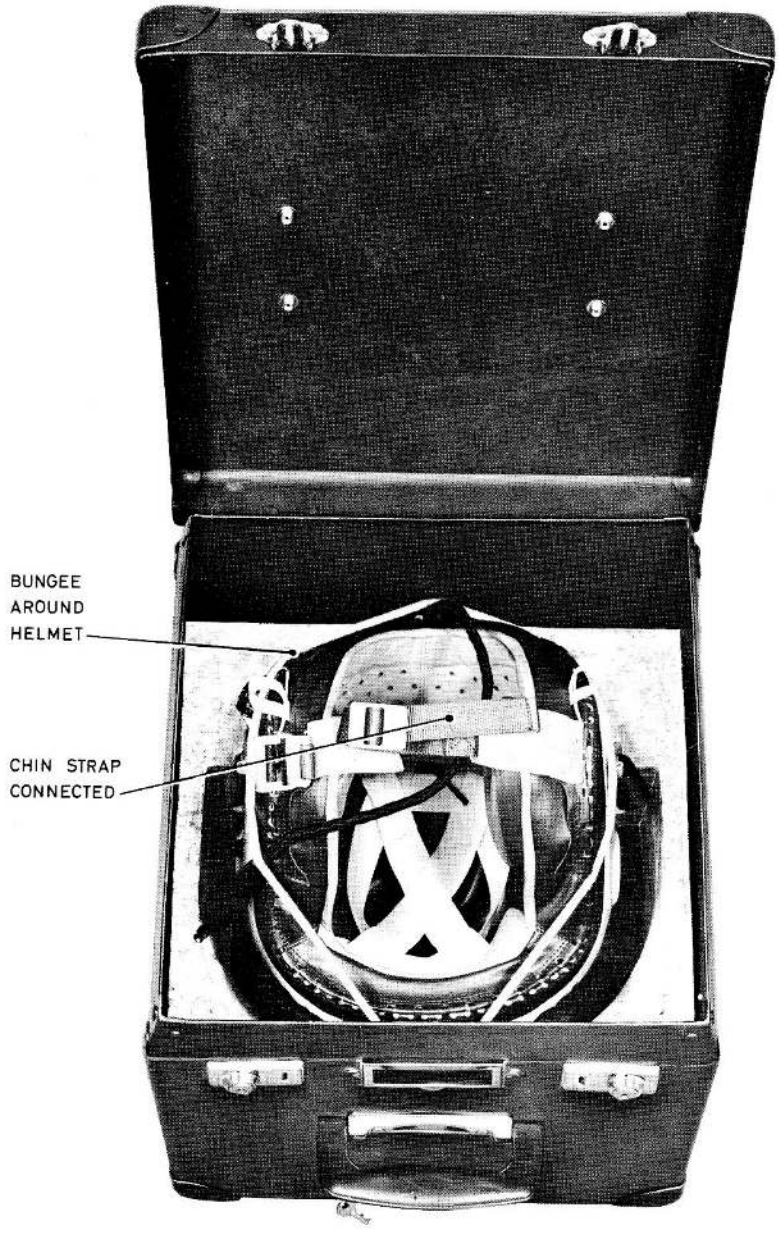

Fig. 5 Helmet stowage

(7) Connect the chin strap. To do this pass the adjuster buckle (on the strap) through the eye buckle (on the helmet) from the inner side outwards, the wider, stepped, side of the adjuster first. The adjuster will seat and lock in the recess in the eye buckle. Pull on the free end of the strap to tighten and secure with the Velcro fastener.

Doffing the helmet

20. To remove the helmet:-

(1) Disconnect the chin strap quick-release buckle.

(2) Turn the toggle buckles to the rear, releasing the neck strap.

(3) Using the loops and pressing back the ear capsules as for donning, pull the helmet off the head.

(4) After use the helmet should be wiped and hung up to dry.

(5) When thoroughly dried and aired, stow the helmet in the case provided (*fig.* 5). The helmet is placed crown downwards in the case and secured by passing the bungee straps round the outside, rigid part of the helmet (not over the top).

SERVICING

21. Servicing the helmets consists of periodical cleaning and examination for wear or damage. Broken stitching may be made good and small tears in the lining may be repaired. The paint of the shell may be touched up but only white polyurethane paint may be used. The visor may be cleaned with Empirol Pt. No. 01/119. Other wise, repair is by replacement of the damaged or worn item.

22. If the cradle harness straps become dirty they should be washed with soap and water in situ without removal from the helmet. Detergents are not to be used for this purpose.

Changing the mic-tel connector assembly

23. If a fault develops in the mic-tel connector assembly it can be removed and a new one fitted as follows:-

(1) Rest the back of the helmet on a work table using a soft pad to prevent damage to the surface finish and assist in holding the helmet steady (the sponge pad can be removed from the storage case for this purpose).

(2) Pull the neck pad forward to expose the interior of the helmet, untie the nylon lace securing the lining to the shell and unlace for about six inches on each side of the centre line.

(3) Unfasten the grey sponge pad and cable assembly. Remove the pad and lay to one side.

(4) Sever the lashings on the outside of the helmet, one of which secures the rubber telephone holder, while the other holds the cable to the rubber housing. Do not sever the lashings securing the sound tubes to the housing.

(5) Unscrew the terminals from the receiver and release the two 6 B.A. screws retaining the microphone plug.

(6) Take out the complete cable assembly.

(7) Remove the old lashing thread.

(8) Lash the rubber housings to the shell with a minimum of three turns of double thread (*Ref. No.* 32B/644) on either side and securely tie off the ends.

(9) Re-fasten the microphone plug. Treat the screws with locking varnish (*Ref. No.* 33B/9433454) before re-assembly. The ends of the metal clip on the end of a new plug cable assembly may require setting slightly to align the rivet nuts with the 6 B.A. screws.

(10) Secure the cable to the helmet at the point of entry of the black lace, tying off with a reef knot on the inside.

(11) Secure the grey sponge pad by passing the free ends of this lace through the holes in the pad and again secure with a reef knot on the inside.

(12) Using a bodkin re-thread the nylon lace through the loops in the lining (*fig.* 6) and the alternate loops corresponding on the shell, first on one side and then on the other, finishing by crossing the lace through adjacent loops on either side of the join in the centre back of the helmet and tie off securely, ensuring the lace is taut and the lining not puckered or distorted.

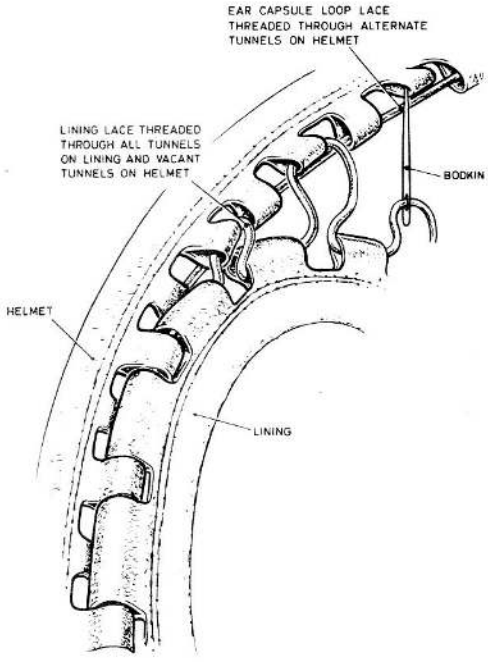

Fig. 6 Lacing the helmet lining

(13) Test the telephone assembly for continuity.

Dismantling and re-assembly (*fig.* 7)

24. The following gives the sequence of operations for complete dismantling and re-assembly of the replaceable items so that the method of replacement of any particular single component is evident. Generally re-assembly is the reverse of dismantling and is only noted where the operations differ. On re-assembly all screw threads must be treated with locking varnish (*Ref. No.* 33B/9433454) except where self-locking nuts are used.

25. Proceed as follows:-

Chin strap

(1) Remove the two rearmost mushroom-headed screws which pass through the top of the helmet.

(2) Draw the straps, buckle ends first, through the slots on each side of the lining and out of the leather tunnel, (with the Velcro fastener) on the right-hand side.

Neck strap

(3) Turn down the neck pad. Disconnect the ends of the neck strap from the adjuster buckle.

(4) Remove the screws, on which the toggle buckles hinge, on each side of the helmet.

(5) Draw out the two halves of the strap through the slots in the shell.

(6) On re-assembly the free end of the left-hand strap (as worn) must pass through the buckle from front to back and be threaded back over the buckle bar and through the becket so that the loose end is behind, facing the shell. Some helmets are fitted with a grey neck strap. In this case the strap passes through the buckle in the reverse direction so that the loose end finishes in front (see *fig.* 8).

Removing the complete headset

(7) Remove the cable assembly as described in para. 23 operations (1) to (8) inclusive.

(8) Remove the lashings attaching the telephone to the shell.

(9) Remove the two mushroom-head screws in the foremost position through the top of the helmet.

(10) Unlace the lower nylon cord far enough to release the tape loops attached to the ear capsules.

(11) Remove the headset assembly complete. When re-assembling the headset thread the lace through the alternate loops and secure as described in para. 23 (12).

Removing the lining

(12) To remove the lining complete unfasten the upper lacing. This is tied at the back. Draw the lace completely out of the alternate lacing tunnels, freeing the lining and separating it from the rim of the shell.

Re-attaching the lining (fig. 6)

(13) If a new lining is to be fitted it is

advisable also to fit a new chin strap as the Velcro fasteners on the old and new lining may not match. Thread this through the leather loop and the slots before the lining is laced to the helmet.

(14) Using a new nylon lace and a bodkin, start at the centre point of the helmet at the top of the face aperture rim. Lace the cord through the alternate tunnels left vacant by the loop attachment cord on the helmet castellated strip and the wider loops on the lining (*fig.* 6). Work from the centre of the face aperture to the centre of the back of the helmet (where the pigtail emerges) first one half and then the other, taking care to leave sufficient length of lace on each side for the purpose. Tie off as described in para. 23. Check the lacing carefully before tying off to make certain the lining is not puckered or a tunnel has been missed.

Removing and renewing the visor screen

(15) The visor screen is removed by taking out the four screws securing it to the carrier. If necessary to remove the complete assembly remove the track also. This is secured to the shell with self-tapping screws. Ensure that the screws enter the shell at the correct angle and are not driven in too far.

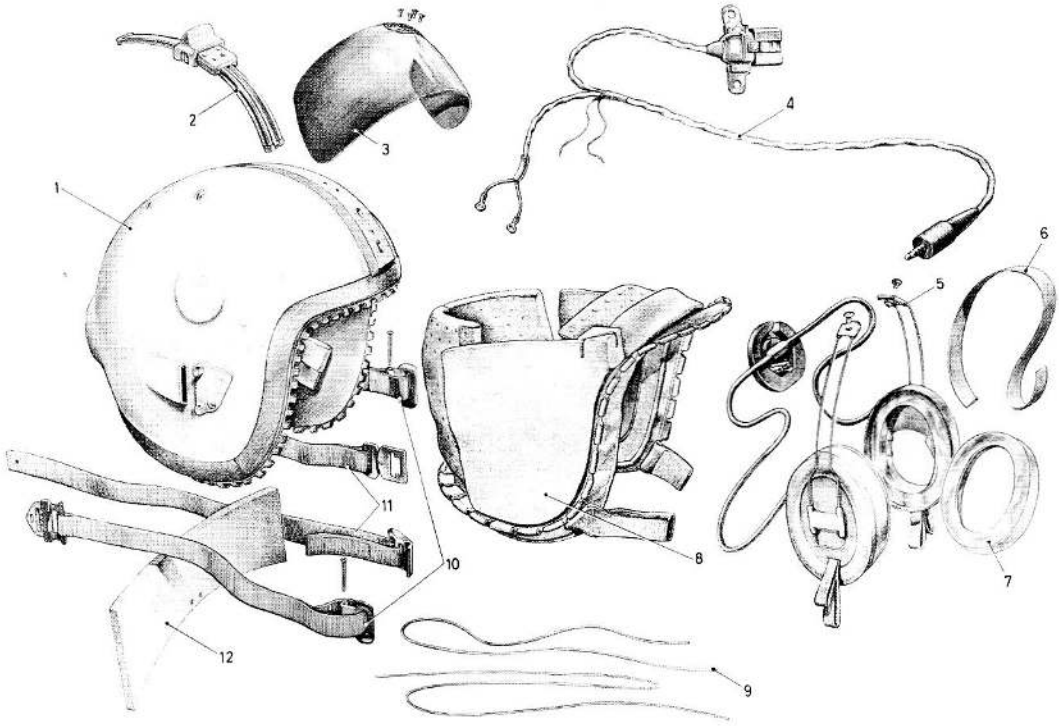

Fig. 7 Dismantling the helmet

1	SHELL	7	FLUID SEAL
2	TRACK AND MECHANISM	8	LINING
3	VISOR MK. 2C	9	LACES
4	CABLE ASSEMBLY	10	NECK STRAP (L.H. AND R.H.)
5	TELEPHONE AND HEADSET ASSEMBLY	11	CHIN STRAP (L.H. AND R.H.)
6	FLUID SEAL ATTACHMENT STRIP	12	SPONGE PAD

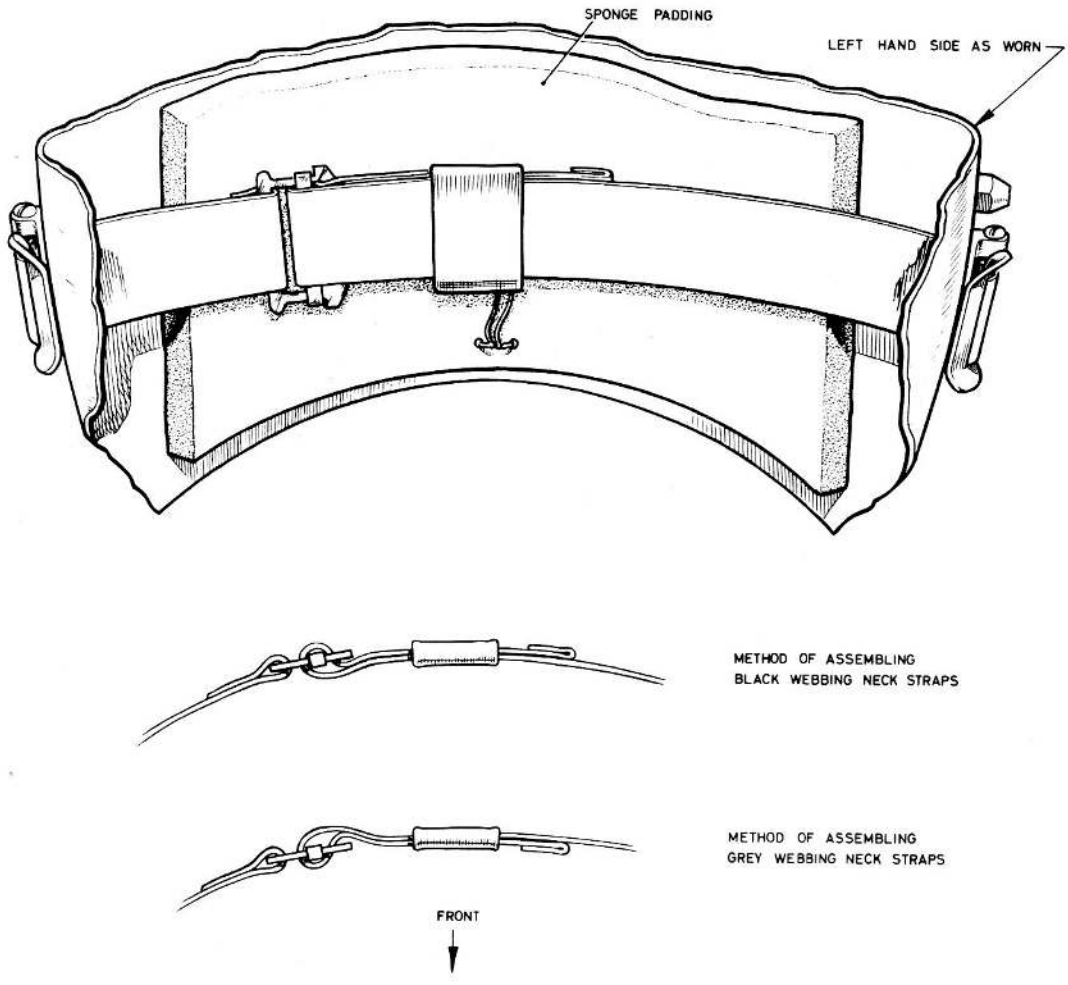

Fig. 8 Assembly of neck straps

Renewing the ear capsule seal

26. Damage to the ear capsule seals will cause the glycerine/water mixture to leak and may necessitate the stripping and cleaning of the helmet before renewal. The lining should be completely removed (see para. 25) and sponged with clean water to remove all traces of glycerine and allowed to dry before re-fitting.

27. To renew a damaged capsule proceed as follows:-

(1) Remove the screw at the top of the helmet and detach the wire frame which holds the damaged capsule. Avoid straining or kinking the accustic tube.

(2) Examine for fluid in the capsule or the tube. If present remove the complete telephone headset assembly and fit a replacement. (If fluid has entered the tube the sound properties will be seriously impaired).

(3) If fluid is not present in the interior, remove the strip of self-adhesive tape and remove the damaged seal.

(4) Fit a new seal with a length of black

self-adhesive P.V.C. tape (*Ref. No.* 22C/2554). The seals are handed and the flange of the replacement seal is now external as distinct from earlier seals with the flange inside the skirt. The protrubrance on the flange must be turned rearwards.

(5) After fitting a new seal check the headset with Test Set 376 (*Ref. No.* 10S/-16328) checking that the signal is received with equal strength in both capsules.

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