Chapter 6

(Completely revised)

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LIST OF ILLUSTRATIONS

Introduction

1. Types P and Q oxygen masks are intended to supersede the Type A.13-A variants. Their advantages are that they provide a more efficient face/mask seal, enabling higher pressures to be held within the facepiece, are more comfortable in normal use, and permit better vision. They must be used with the Mk. 17D or later types of demand or demand and inflation oxygen regulators and except for the P.6 and Q.6 masks, are to be worn with a well fitting, properly adjusted Type G helmet or with a Mk. 2 or 2A protective helmet. Types P.6 and Q.6 masks are used with headsets. Personnel are not permitted to wear the masks in flight until they have been fully indoctrinated into their use by the responsible medical authority. The limits of protection afforded by the masks when used in combination with other pressure clothing and breathing equipment are given in A.P.129 and 1182, Vol. 1.

2. The variants of the two types of masks are:—

Ref. No. 6D/	Nomenclature
2050	Oxygen mask, Type P.1 (fig. 1)
2342	Oxygen mask, Type P.1A (fig. 2)

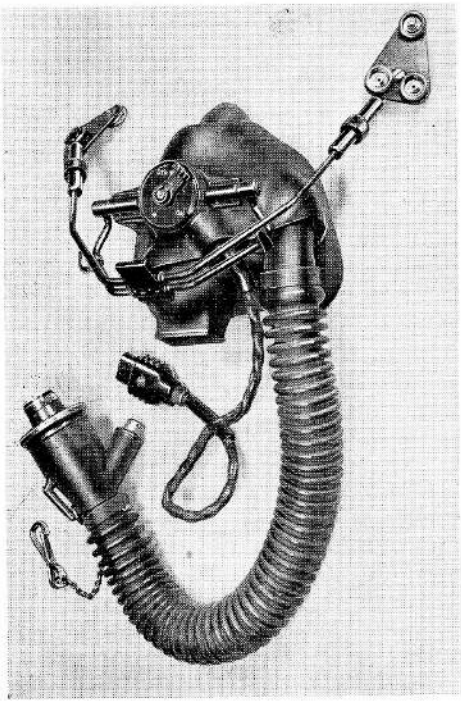

Fig. 1. Oxygen mask, Type P.1

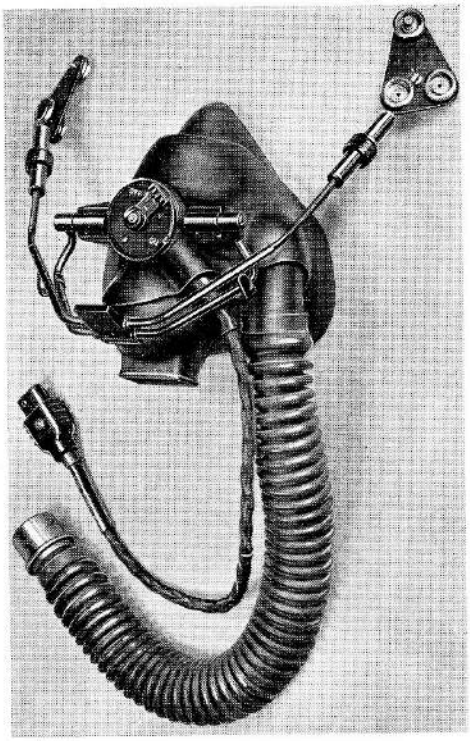

Fig. 2. Ogygen mask, Type P.2

2357	Oxygen mask, Type P.1A (med)
3040	Oxygen mask, Type P.1B
3041	Oxygen mask, Type P.1B (med)
2052	Oxygen mask, Type P.2 (fig. 3)
2307	Oxygen mask, Type P.2A (fig. 4)
2358	Oxygen mask, Type P.2A (med)
3042	Oxygen mask, Type P.2B (fig. 6)
3043	Oxygen mask, Type P.2B (med)
2627	Oxygen mask, Type P.4 (fig. 5)
2628	Oxygen mask, Type P.4 (med)
3044	Oxygen mask, Type P.4B
3045	Oxygen mask, Type P.4B (med)
2760	Oxygen mask, Type P.6
2761	Oxygen mask, Type P.6 (med)
2341	Oxygen mask, Type Q.1
2343	Oxygen mask, Type Q.1A
2359	Oxygen mask, Type Q.1A (med)
2342	Oxygen mask, Type Q.2
2309	Oxygen mask, Type Q.2A (fig. 4)
2360	Oxygen mask, Type Q.2A (med)
2700	Oxygen mask, Type Q.4
2701	Oxygen mask, Type Q.4 (med)
2762	Oxygen mask, Type Q.6
2763	Oxygen mask, Type Q.6 (med)

3. The differences in the P and Q range lie in the sizes of the facepieces, the Q range being provisioned for personnel having small

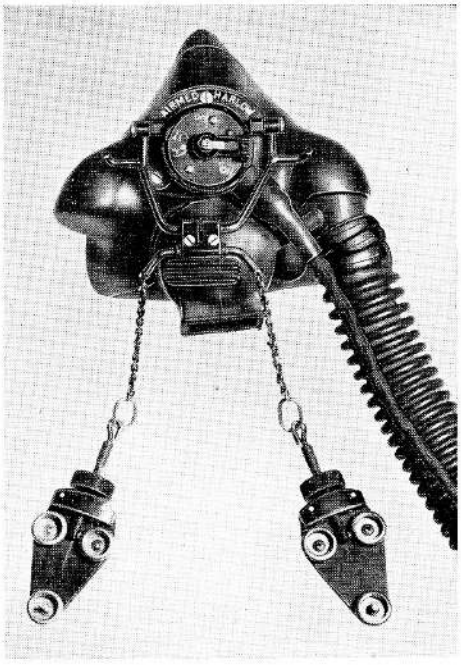

Fig. 3. Oxygen mask, Type P.1A

features or other facial characteristics which render a P type mask unsuitable. The P and PA series masks are fitted with Type 59 microphones (Ref. No. 10A/19043) and Type 1273 switches (Ref. No. 10F/1766), while the PB and Q type masks are equipped with the miniature microphone and switch assembly (Part No. 13125). Those masks designated (med) have facepieces made from an anti-dermatitic mix and are issued on medical prescription to personnel showing a tendency to contract dermatitis after wearing masks with facepieces made from the standard mix.

P.1 and Q.1 masks

4. Normally these are used at positions at which there is no P.E.C. They are fitted with Type M.C.3/A1 inlet warning connectors (Ref. No. 6D/2003) which enable the mask tubes to be connected to either the main aircraft oxygen supply or an emergency oxygen set. An adapter (Ref. No. 6D/2428) is available for use with the masks and this may be permanently attached to the inlet warning connectors so that the masks may

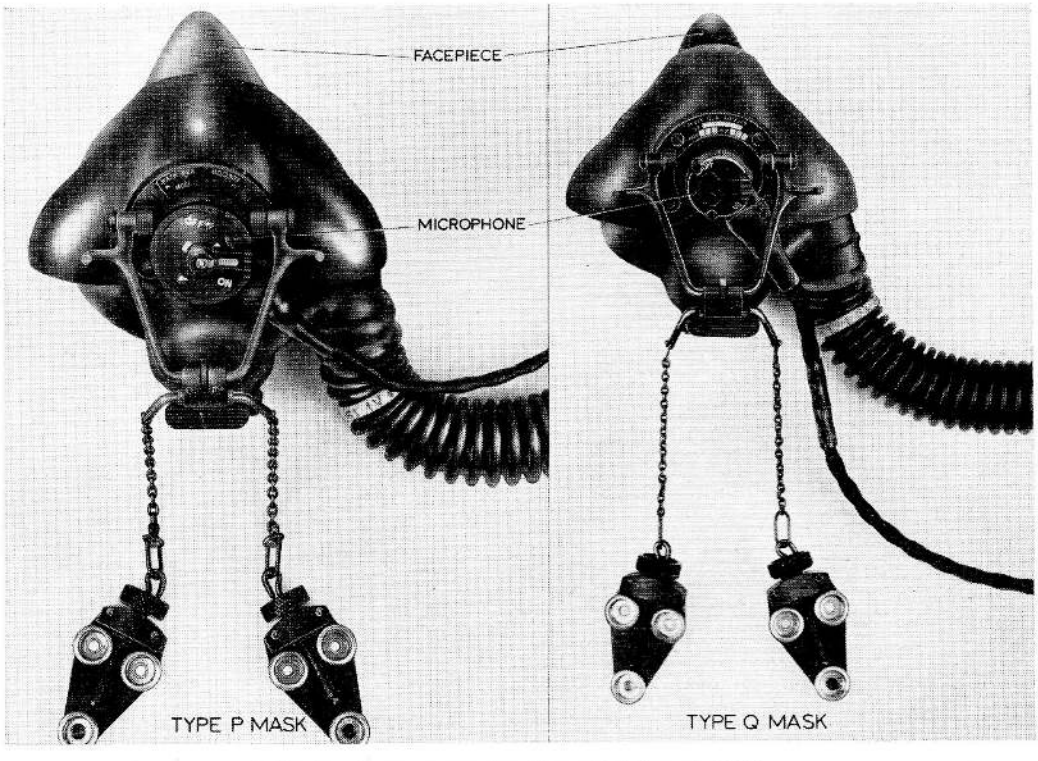

Fig. 4. Oxygen masks, Type P.2A and Q.2A

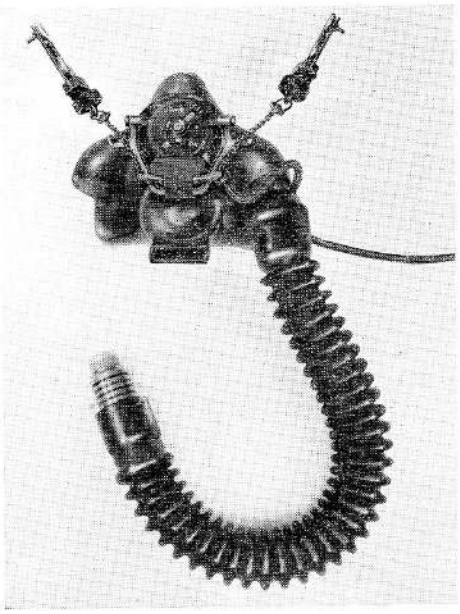

Fig. 5. Ogygen mask, Type P.4

be used either with or without a P.E.C. in those aircraft in which crew members change positions during the course of their duties.

P.2 and Q.2 masks

5. P.2 and Q.2 masks are used with a P.E.C. and either with or without a pressure jerkin as appropriate. They are fitted with a Mk. 7 bayonet union plug (Ref. No. 6D/2053).

6. The P.1 and 2 and Q.1 and 2 masks are fitted with a rigid toggle harness. This allows the mask to rest on the chest ready for use, and permits adjustment of the face/mask seal for either low altitude flying or for pressure breathing.

P.1A, 2A, Q.1A and 2A masks

7. These mask are fitted with a chain toggle harness which gives an improved face/mask seal, permits better vision and reduces the risk of injury from the harness and the weight of the masks.

P.4 and Q.4 masks

8. P.4 and Q.4 masks are standard P.2A and Q.2A masks adapted for use in aircraft fitted with Oxy/Mic/Tel systems. The Mic/Tel cables are incorporated in the mask tube assemblies and terminate in the mask plugs. These masks may only be used with Type G

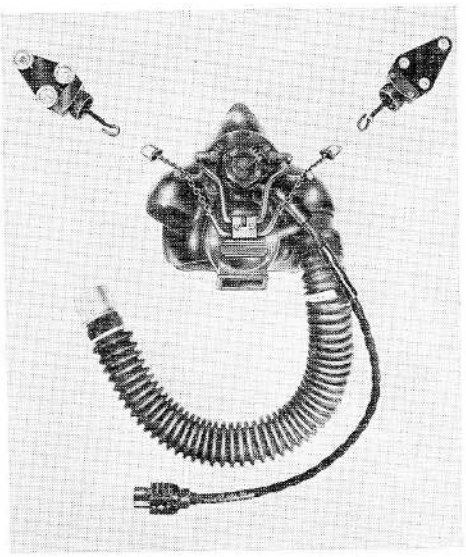

Fig. 6. Oxygen mask, Type P2B

helmets fitted with special helmet connectors or with Mk. 2 or 2A protective helmets fitted with a special purpose branch cable assembly.

P.6 and Q.6 masks

9. These masks are variants of the P.2A and Q.2A having yoke and chain assemblies embodying turnbuckle adjusters in the chains, terminating in loop ends suitable for connection to the hooks provided on a head set Airmed Type 5385.

PB series masks

10. PB series masks are similar to their P.1A, P.2A and P.4 counterparts, but they are fitted with the miniature microphone and switch assembly as used in Q type masks.

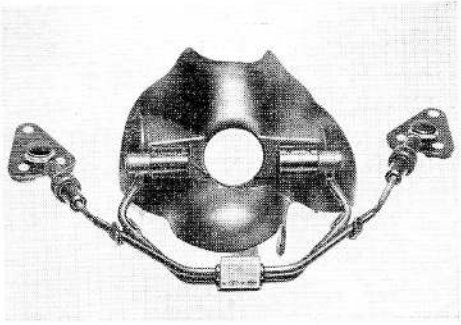

Fig. 7. Exo skeleton and rigid toggle harness

The facepiece differs from those of the PA series in that it is designed to accommodate the smaller microphone, while the chain harness is suitably modified to obviate fouling of the harness bow on the microphone lead.

11. The foregoing are the distinguishing features of the masks. In their general design, method of operation and the types of the valves fitted they are identical.

DESCRIPTION

12. A mask consists of a facepiece which fits over the mouth and nose but leaves the chin exposed. It is fitted with inspiratory and expiratory valves, a microphone and lead, mask tube or mask tube combined with Mic/Tel cables, and either a rigid or chain toggle harness. Over the facepiece is an exo skeleton (fig. 7) moulded to fit snugly to the face so that it exerts an even pressure over the facepiece. The skeleton provides a mounting for the harness which is secured to it by spigoted set screws about which the outer bow of the harness can rotate from the normal to the pressure breathing position.

13. The facepiece is moulded in soft rubber. It has a reflected edge so that rising pressure within the mask, bearing on the inturned edge, increases the efficiency of the face/mask seal. The valves and the microphone are inserted into the facepiece, the inspiratory valve complete with an iceguard in the left cheek, the expiratory valve over the mouth and the microphone immediately above the expiratory valve. On the outside of the facepiece, directly over the inspiratory valve, is the inlet connector to which the mask tube is fitted. A stiffening piece in the nose bridge enables the bridge to be shaped to fit the nose to assist in achieving the best face/mask seal.

14. The inspiratory valve is a simple non-return valve consisting of a plastic moulding in which is inserted a mushroom-headed diaphragm which lifts as the wearer breathes in and permits oxygen to pass from the mask tube into the facepiece. The valve is protected by an iceguard in the form of a fine mesh filter.

15. The expiratory valve is a compensated return valve in which the mask tube pressure is applied to the under side of a diaphragm through a compensating tube. When air/oxygen mixture or pure oxygen is being supplied at pressures above ambient, the compensating pressure, acting on the underside of the diaphragm, forces a piston against a valve plate and prevents it from lifting under the pressure within the mask. Under normal conditions the piston is maintained in contact with the valve plate by a conical spring which is fitted between the piston and the valve body. When a heavy demand is made and the piston is drawn into the diaphragm chamber, the valve plate is kept on its seating by a second spring fitted between the piston and the valve plate. The valve plate lifts and allows the exhaled gases to pass through the expiratory duct when the pressure within the mask exceeds the compensating pressure and spring load combined. An orifice connects the compensating tube with the diaphragm chamber and eliminates transient instability.

16. The rigid toggle harness consists of inner and outer bows jointed at their centres by a toggle lever, the whole being secured to the exo skeleton by the ends of the inner bow (fig. 7). The ends of the outer bow are threaded to permit the adjustment of turnbuckles enabling the mask to be fitted to the individual wearer. Triangular plates connected to the outer ends of the turnbuckles and fitted with the female portions of three press studs, enable the harness to be attached to corresponding male portions on the helmet. On the inner bows of the harness are two hooks used to locate the arms of the outer bow. The function of the harness is to provide a means of tightening the face/mask seal in preparation for pressure breathing. With the toggle in the upper position a normal face/mask seal is provided; when the toggle is turned to the down position, the outer bow of the harness is pulled forward and downward relative to the inner bow and a tighter face/mask seal results.

17. The chain harness performs the same function. It also consists of two bows, one swivelling outside the other but, instead of having the rigid arms, the outer bow is connected to the anchorage plates by two short

lengths of chain. The chains lie over hooks similar to those on the rigid harness. Each chain is fitted with a swivel link to prevent the possibility of its being tensioned while in the twisted condition. The chain toggle harness is readily detachable from the right-hand chain adjuster, thus enabling the mask to be detached from this side and suspended from one chain during standby periods. An open hook and a retaining ring introduced by Mod. M.O.100, are employed to connect the harness to the left-hand chain adjuster, hence the harness can be readily detached from the two mounting plates (fig. 6); this is necessary when the masks are used with Mk. 2 or 2A protective helmets (fig. 8).

Note . . .

When the mounting plates are detached from the mask harness, they must be retained for subsequent use when the mask is worn with a Type G helmet.

Attaching a mask to a Type G helmet

18. The sequence is:—

(1) Remove the screws and washers from the triangular attachment plates.

(2) Attach the appropriate plates to the lower trio of studs on each side of the helmet.

Fig. 8. Mask fitted to Mk. 2 protective helmet

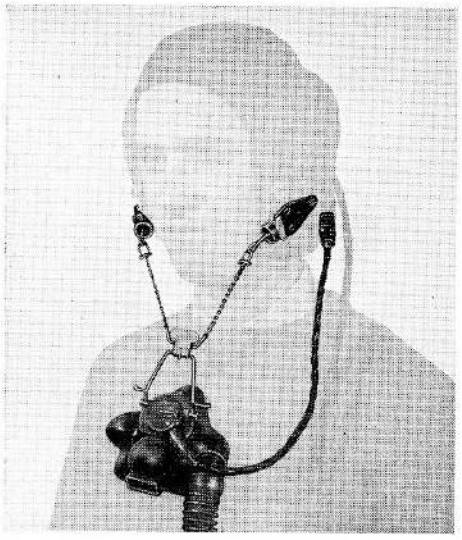

Fig. 9. Mask, with chain harness, in rest position

(3) Secure the press stud at the apex of each plate to the helmet with the screw and washer.

(4) Ensure that the left-hand mounting plate and chain are connected correctly. To attach the mounting plate to the chain harness, pass the PTFE retaining ring over the hook (chamfered end leading) until the ring is just clear of the curved part of the hook. Engage the hook in the swivel link and then lock the swivel link by sliding the retaining ring towards the thread.

(5) Connect the microphone/helmet connector of the mask to the plug on the helmet.

If high 'g' loads are anticipated, or there is a tendency for the mask to slip when fitted to the lower trio of studs, the attachment should be made to the upper studs.

19. When a P.4 or Q.4 mask is being fitted, ensure that the appropriate helmet connector (Pt. No. O.P.4310) is fitted to the helmet. The procedure for fitting the helmet connector is detailed in Sect. 1, Chap. 5. After the mask has been fitted to the helmet, remove the screw and nut from the mask telephone socket, discard the earthing clip and insert the helmet connector plug. Ensure that the assembly does not fall apart when

Fig. 10. Snapping the harness into place to locate the outer bow in hooks

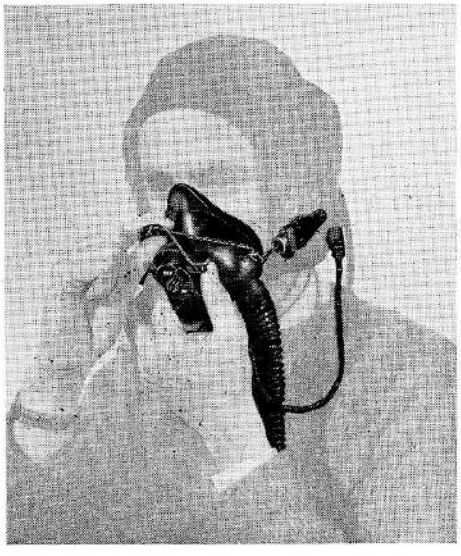

Fig. 12. Lifting the mask to the face

Fig. 11. Lowering a mask, with rigid harness, to the rest position

Fig. 13. Chain harness adjusted

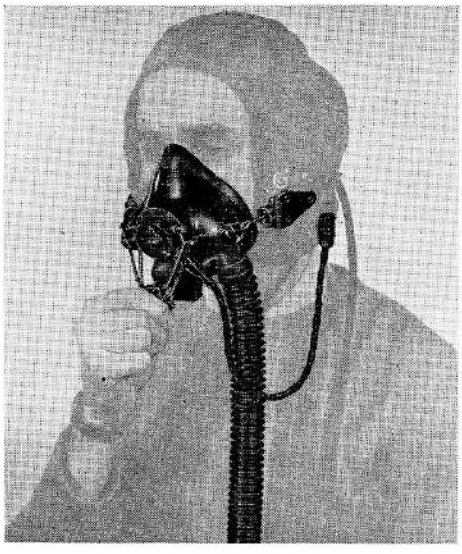

Fig. 14. Tightening the face/mask seal by operating the toggle

the screw and nut are removed. Align the hole in the plug clip with that in the socket and secure it with the screw and nut.

Adjusting the harness

20. Before fitting the helmet and mask, unscrew the harness adjusters and, if a chain harness is fitted, ensure that the chains are free from tangles. Put on the helmet and allow the mask to rest on the chest (fig. 9). Masks fitted with chains may be allowed to hang by one or both chains.

Rigid harness

21. To adjust a rigid harness, lift the mask on to the face and, as it is positioned, allow the outer bow of the harness to swing downwards until it lies in the hooks of the inner bow (fig. 10). During this operation the toggle lever must be in the upper position. The lever is not to be used either to pull the mask on to the face or the harness into position. Rotate the turnbuckles evenly to tighten them and manipulate the nosebridge stiffener until a comfortable fit and satisfactory face/mask seal are achieved when tested in accordance with para. 26. If the ear buns of the helmet are found to have moved, the webbing straps on the helmet should be re-adjusted to align them correctly. When removing the mask it should be held as shown in fig. 11.

Chain harness

22. When about to adjust a chain harness, first connect the chains to the helmet, hold the bow away from the facepiece and place the mask on the face. During this operation the toggle must be in the upper position and the bow must be pressed outward and downward to maintain tension in the chains (fig. 12). This prevents mal-alignment of the links and assists in correct location of the chains on the hooks. Ensure that the chains are resting in the hooks and then tighten both adjusters until a satisfactory pressure seal and comfortable fit are achieved. Adjust the contour of the nose piece stiffener until the upper portion of the mask conforms to the face.

23. For normal use (low-pressure position), the toggle lever must point upwards (fig. 13). For pressure breathing and in an emergency (high-pressure position) the lever must point downwards. The method of selecting this position is shown in fig. 14. Moving the lever downwards increases the tension in the harness and causes the mask to be drawn tighter on to the face. When removing the mask the toggle lever must be moved to the upright position before the bow is pushed upwards.

24. Failure to achieve a satisfactory face/mask seal may be the result of:—

Fig. 15. Mask suspended from Mk. 2 protective helmet

(1) Wearing the wrong size of helmet.

(2) Incorrect adjustment of the neck strap of the helmet and/or harness.

(3) Incorrect vertical adjustment.

If a P type mask cannot be adjusted to hold the specified pressures, the altitude at which the wearer is permitted to fly should be restricted until a suitable Q type mask is available.

Fitting the mask to a Mk. 2 or 2A protective helmet

25. The Mk. 2 and 2A protective helmets are fitted with hooks for the attachment of the masks, hence the mounting plate assemblies are not required. The procedure for fitting the mask to the helmet (fig. 15) is as follows:—

(1) Screw both hooks fully forward.

(2) Tilt the small plastic locking ring on the left-hand attachment hook, to the 8 o'clock position.

(3) Connect the chain ring, on the left-hand side of the mask, to the hook.

(4) Push the locking ring back until it abuts the screwed stem.

(5) Hook the other chain on to the right-hand side of the helmet.

(6) Press the mask close to the face and adjust the chains so that the mask is held lightly in position.

(7) With the wearer supporting the mask, loosen the two mushroom-head screws $1\frac{1}{2}$ to 2 turns.

(8) Using the vertical adjustment provided on the helmet, move the attachment hooks up or down, as required, to obtain the best face/mask seal and then retighten the screws.

Testing the face/mask seal

26. The correct fitting of the mask is essential if the maximum benefit is to be obtained in an emergency. The face/mask seal is, therefore, to be tested before a mask is used. Before using a mask, connect it to the appropriate regulator and adjust the tension in the harness until the mask just holds the following pressures:—

(1) With the harness toggle up:—

(a) Mk. 17 series regulators—Emergency toggle to left or right—2 in. W.G.

(b) Mk. 20 series regulators—Emergency position—2 in. W.G.

(c) Mk. 21 series regulators—Emergency position—2 in. W.G.

(d) Type 120 regulators — 100% OXYGEN—1 in. W.G. (nominal).

(2) With harness toggle down and no jerkin:—

(a) Mk. 17 series regulators—Emergency toggle depressed—10 in. W.G.

(b) Mk. 20 series regulators—Mask test position—13 in. W.G.

(c) Mk. 21 series regulators—Mask test position—13 in. W.G.

(d) Type 120 regulators—Mask test button depressed—0·5 lb/in^2.

(3) With harness toggle down and wearing a jerkin:—

(a) Mk. 20 series regulators—Jerkin test position—1·25 lb/in^2.

(b) Mk. 21 series regulators—Jerkin test position—1·1 lb/in^2.

(c) Type 120 regulators—both test buttons depressed—1·0 lb/in^2.

Important . . .

The regulator control must not be set to Jerkin Test unless a jerkin is being worn. During tests the nosepiece is to be manipulated to conform to the contour of the face. Any readjustment necessary to achieve the required readings are to be made as described in para. 21 *and* 22 *as appropriate.*

27. When the equipment is correctly adjusted some discomfort may be experienced if there is a sudden reduction in cabin pressure. To relieve the pressure, short, sharp breaths may be taken or the finger inserted between the face and the mask. In normal climbing conditions, the rate of change of pressure is gradual enough for the effect on mask pressure to be tolerable.

SERVICING

On receipt

28. Turn back the edge of the facepiece and minutely examine every point of the periphery of the expiratory valve to ensure that it is not displaced. If any part is incorrectly located, refit the valve in accordance with the instructions given in para. 46.

Pre-flight examination and tests

P.1 and Q.1 series masks

29. (1) Check that all visible components are clean, correctly positioned, secure and undamaged, paying particular attention to the iceguard. Depress the expiratory valve several times to ensure that it is free from saliva.

(2) Fit the blanking plug to the inlet warning connector and support the helmet so that none of its weight is taken by the mask tube. Hold the facepiece in one hand and the mask tube plug in the other, collapse the mask tube concertina fashion and suspend the mask from the plug. The mask should not extend more than $\frac{1}{2}$ in. in 10 sec. If it does the inspiratory valve is suspect and is to be cleaned as described in para. 43.

(3) Fit the mask to the face for normal breathing and check the face/mask seal in accordance with the appropriate test described in para. 26.

(4) Breathe in deeply, blank the end of the mask tube and then exhale. There should be no resistance to exhalation.

(5) With the toggle in the pressure breathing position, test the expiratory valve by operating the MASK TEST control on the regulator, inhale deeply and hold the breath. If the mask is properly fitted and oxygen continues to flow, the expiratory valve is suspect or the mask is punctured. In either event the mask is unserviceable.

(6) Test the inlet warning connector by depressing and releasing the valve plate several times, using the plunger arms projecting from the side of the plug. Ensure that the valve operates freely. Hold the facepiece firmly to the face and repeat the manual operation of the valve while inhaling. There should be no resistance to inhalation but, with the valve released, resistance should be noticeable.

P.2 and Q.2 series masks

30. Complete the examination and tests described in para. 29 (1) to (5) for the P.1 and Q.1 series masks except that, when testing the inspiratory valve, the union plug is to be sealed by holding the thumb over it instead of using a blanking plug.

P.4 and Q.4 series masks

31. These are also to be examined and tested in accordance with the instructions of para. 29 (1) to (5) with the exception quoted in para. 30 but with the following additions:—

(1) Examine the annular contact rings and the plastic nose piece on the mask tube plug for cleanliness and freedom from burrs. Examine the mask tube for damage and the Mic/Tel loom for damage, deterioration and security of attachment to the mask tube; if there is local separation of the mask tube/loom joint, the mask is to be considered unserviceable.

(2) Put on the helmet, fit and adjust the mask assembly, and connect the mask tube plug to the system. Receive and repeat a standard speech test sentence and check that, while manipulating the joints of the system, the quality of speech is not impaired.

P.6 and Q.6 series masks

32. These are to be tested in the same manner as the P.2A and Q.2A series.

After-flight cleaning (all masks)

33. After every occasion on which it has been used, a mask is to be wiped clean and free from dust and perspiration with a clean

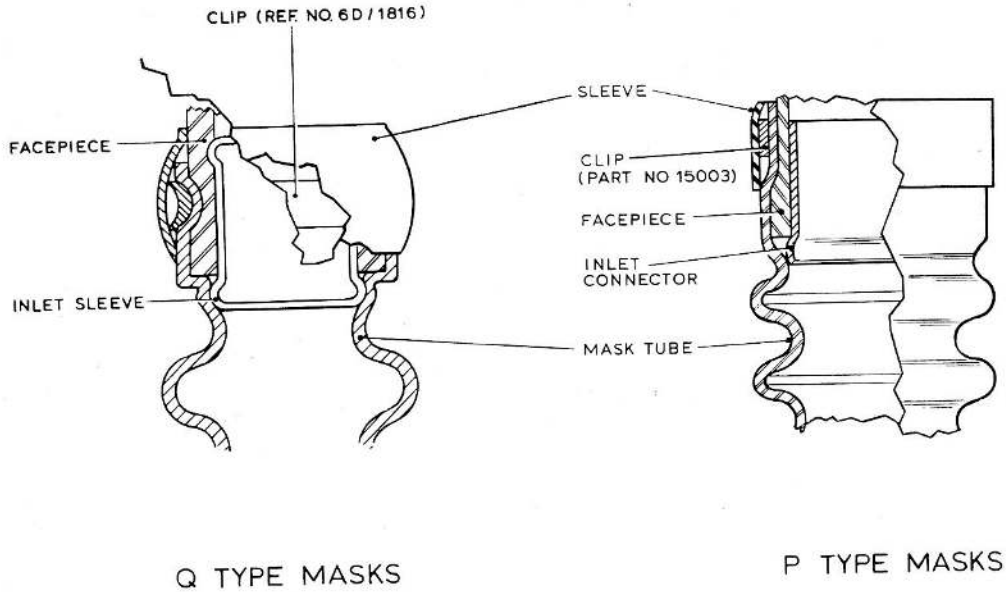

Fig. 16. Mask/hose joint—masks not fitted with Oxy/Mic/Tel hose assemblies

non-fluffy cloth slightly dampened. After a mask has been used with a protective helmet, both the mask and the helmet are to be thoroughly aired and dried before placing in the helmet storage case.

Periodic examination and tests (all masks)

34. These are to be in accordance with the instructions given in Vol. 4 at the periods stated therein.

35. All components of P and Q type masks may be renewed. Type M.C./3A1 Inlet Warning Connectors and Mk. 7 Bayonet Union Plugs may not be interchanged since the diameters of these are different and interchanging them will cause a permanent set in the hose and prevent a gas-tight joint being achieved.

Renewing a hose and/or end connector

Masks not fitted with Oxy/Mic/Tel hose assemblies

36. (1) Peel back the rubber bands covering the Airmed clips securing the hose to the mask end fitting.

(2) Unfasten the clips and remove the hose.

(3) Fit the new hose ensuring that the joints are dry. Lubricants are not to be used. When fitting the hose over the mask inlet, ensure that the end of the hose registers with the inner end of the inlet connector. Details of the mask hose joints for P and Q series masks not fitted with Oxy/Mic/Tel hose assemblies are shown in fig. 16.

(4) Fit new Airmed clips and trim off any excess length.

Note . . .

The opening key from a Mk. 4 Emergency Ration tin is a suitable tool for closing the clips. If only the end fitting has to be renewed, the procedure is the same at that end.

37. After a hose has been fitted, the following test is to be applied:—

(1) Attach a spring balance to the exoskeleton.

(2) Grasp the oxygen hose at a point just below the clip and exert a pull of 15 lb. Maintain this pull for 5 sec.

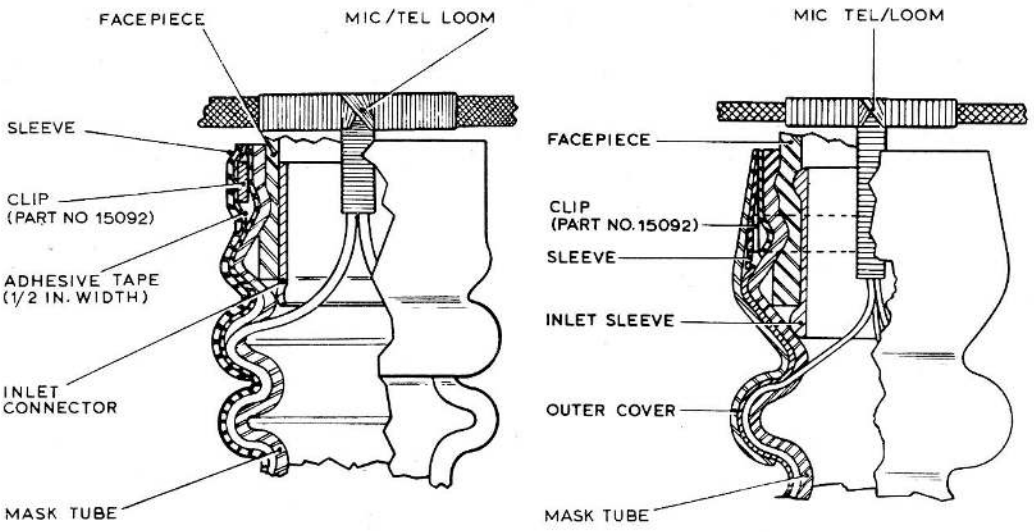

Fig. 17. Mask/hose joint—masks fitted with Oxy/Mic/Tel hose assemblies

(3) After the test is complete, examine the connection and clip for signs of detachment and test the mask on the universal test rig cabinet, Mk. 1 (Ref. No. 4C/2634) as described in A.P.1182G.

If only the end connection has been renewed, a similar test is to be applied but the spring balance is to be attached to the end fitting.

Mask fitted with Oxy/Mic/Tel hose assemblies

38. The hoses assembled to P.4, P.4B and Q.4 masks are fitted with an Oxy/Mic/Tel plug, and the associated cable loom is bonded to the hose. The mask hose and plug assembly can be renewed or, if required, a new plug assembly can be fitted to the hose assembly.

39. The procedure for renewing a mask hose and plug assembly is as follows:—

(1) Disconnect the cable loom from the microphone. For P.4 masks this will entail removal of the microphone (para. 48), while for P.4B and Q.4 masks disconnection is effected by rolling back the rubber sleeve clear of the switch terminals, removing the two terminal screws and washers, and carefully severing the thread which binds the cable loom to the switch housing.

(2) Slide the rubber sleeve clear of the hose/mask inlet connection, remove the adhesive tape (P masks) or inner sleeve (Q masks), then release the clip and plug assembly from the mask.

(3) Assemble the new mask hose plug assembly to the mask inlet and secure with a new clip. Refer to para. 36, sub-para. (3) and (4).

(4) Cover the clip using the $\frac{1}{2}$ in. wide adhesive tape (P.4 and P.4B masks) between the clip and the cable loom, or using the rubber sleeve (Q.4 masks) which should be located over the cable loom. Refer to fig. 17.

(5) Examine the outer sleeve for signs of damage sustained during removal and, if undamaged, reposition the sleeve over the connection.

(6) Treat the outer sleeve with three coats of Necol Patent Rubber (No. H231–9361 with accelerator T.866/1) to DTD.900/4568, dyed black. The Necol Patent Rubber is obtainable ready pig-

mented black and must be mixed with the accelerator in the proportions of 20 parts rubber solution to 1 part accelerator. The treatment must be applied immediately after positioning either the original sleeve or a new sleeve, and intervals of 1 hour must be allowed for drying before applying the second and third coats.

(7) Connect the leads to the switch terminals. For P.4 masks, refer to para. 49. The leads of P.4B and Q.4 masks are secured by means of the two 8BA screws and washers. The yellow lead must be connected to the lower terminal (nearest the expiratory valve) and the green lead to the upper terminal. Bind the cable loom to the switch housing using No. 35 black linen thread.

(8) Ensure that the lower portion of the sleeve is bonded (Bostik 252) securely to the cable, then reposition the upper portion over the lead terminals.

(9) Apply the test detailed in para. 37.

(10) Apply the electrical tests detailed in para. 56 to 59.

40. If it is required to renew the plug assembly, proceed as follows:—

Note . . .

The following instructions should be read in conjunction with fig. 18.

(1) Remove the shroud and the split insulation ring, and discard.

(2) Unsolder the electrical terminations from the plug terminals.

(3) Release the Airmed clip and separate the plug from the mask hose.

(4) Ensure that the lead tags are free of solder, clean and securely crimped.

(5) Carefully remove the shroud and split insulation ring from the new assembly.

(6) Assemble the new plug to the mask hose, and arrange the plug so that the red and blue conductors of the hose are aligned with the slot (between the red and blue terminals) in the plug body.

(7) Secure the plug to the hose using a new Airmed clip. The clip is to be below the leads and must be covered with the two layers of P.V.C. self-adhesive tape. A suitable tool for closing the clip is specified in the Note following para. 36 (4). After closing the clip, remove any excess length.

(8) Using solder to BS.441 and flux to DTD.599, solder the lead tags to the plug terminals bearing the corresponding colour marking; the black lead is to be soldered to the blue terminal. A suitable heat sink must be used to prevent heat reaching the PVC insulation of the leads.

(9) Apply three coats of varnish (DEF. 32, Type 2) to all soldered joints and surfaces normally covered by the insulation ring.

(10) Refit the insulation ring and the shroud.

(11) Apply three coats of Necol Patent Rubber to the shroud immediately after assembling the plug to the mask hose. The procedure for applying this treatment is detailed in para. 39 (6).

(12) Apply the test detailed in para. 37.

(13) Apply the electrical tests detailed in para. 56 to 59.

Removing an ice-guard filter

41. Rotate the filter until the arrow is in line with the locating mark on the facepiece and then withdraw the filter. In masks not provided with a locating mark the filter must be rotated until the lugs are felt to be in line with the cut-away portions of the valve body.

Cleaning the filter

42. All foreign matter is to be blown away by forcing clean, dry air through the filter at moderate pressure.

Removing, cleaning and refitting an inspiratory valve

43. First remove the filter as described in para. 41, then ease the valve from the flanges which secure it in position and lift it out. Lift the valve flap and ease the stem out of the hole in the body of the valve. It will be necessary to slightly stretch the stem so that the bulbous portion will contract and clear the hole. Examine the rubber for signs of deterioration. If the rubber is good, clean every part of it with a clean, non-fluffy cloth ensuring that all traces of foreign matter are removed. The presence of particles of foreign matter will cause leakage back through the inspiratory valve. Under safety pressure and pressure breathing conditions this would prevent the building up within the mask of a pressure greater than that in the mask tube and the expiratory valve would not open. The importance of thorough cleaning cannot, therefore, be over emphasised.

44. To replace the mushroom flap, the bulbous portion must be inserted into the hole and pressed through until it protrudes on the inside of the body. Firm pressure on the mushroom head will assist. After the flap is in position, ensure that it will snap back by lifting and releasing different parts of the edge.

45. To refit the inspiratory valve on:—

(a) Masks with locating mark in facepiece. The inspiratory valve must be fitted so that the lug slots are at right angles to the mark on the facepiece. When fitting the ice-guard filter, align the arrow on the filter with the mark on the facepiece, apply slight pressure to the filter and then turn clockwise through 90 deg., ensuring that both lugs are engaged with the lug slots. The arrow on the filter should now point towards the expiratory valve.

(b) Masks without locating mark in the facepiece. The inspiratory valve must be fitted so that the lug slots are at four o'clock and ten o'clock, relative to a line passing centrally through the inspiratory valve and the breathing hose connection. When fitting the ice-guard filter, align the arrow on the filter with the one o'clock position, apply light pressure to the filter and then turn clockwise through 90 deg., ensuring that both lugs are engaged with the lug slots. The arrow on the filter should now point towards the expiratory valve.

After the filter has been re-fitted, test the inspiratory valve for leakage.

Removing and re-fitting an expiratory valve

46. If the rubber diaphragm of the expiratory valve is suspect, the valve is to be renewed. To remove a valve, press on the outside of the compensating chamber so that the valve can be eased out. Gently with-

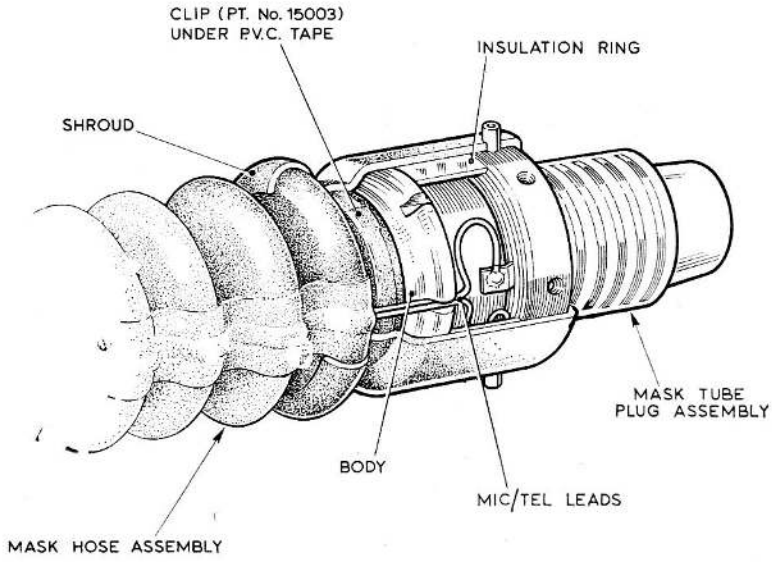

Fig. 18. Details of Oxy/Mic/Tel plug assembly

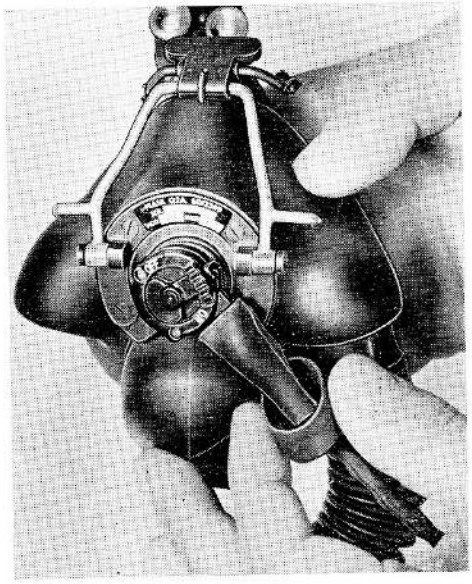

Fig. 19. Removing a microphone—rubber ring detached

draw the compensating tube from the connecting passage, supporting the passage with the thumb to prevent bending of the tube. Lift the valve clear. To replace a valve or fit a new one reverse the procedure, again avoiding bending of the tube or puncturing the rubber passage. Press the valve into position, at the same time kneading the mask moulding into the flange. Finally, work round the flange with a narrow blunt instrument such as the rounded end of the steel rule. After the valve has been inserted there should be no distortion of the rectangular opening at the bottom of the mask. Test the mask for leakage through the expiratory valve.

Note . . .

Early production masks incorporated an expiratory valve with a loose gland. When re-fitting a valve of this type, the facepiece rubber is to be located between the loose gland and the shoulder bearing the nameplate.

Cleaning an expiratory valve

47. Clean the mating surfaces of the valve plate and seating with a sable brush dampened with distilled water. Dry the treated areas with clean, dry air, depress the valve plate and ensure that the valve is free from foreign matter. After cleaning the valve, check that it operates smoothly and satisfies the test described in para. 29, sub-para. (4) and (5).

Removing and fitting a microphone—P and PA series masks

48. (1) Slide the rubber sleeve clear of the connector tunnel on the side of the facepiece.

(2) Remove the rubber sleeve over the wire securing the microphone, take away the wire and ease the microphone clear of the facepiece.

(3) Remove the two screws and detach the switch cover from the microphone.

(4) Take out the three screws arranged diametrically across the body of the switch, remove the small spring contact, and then separate the body and the yellow and black leads from the microphone.

(5) Take out the screw and nut holding the green lead and remove the lead and the large spring contact.

(6) Separate the cable clamp from the connector and withdraw the connector from the mask.

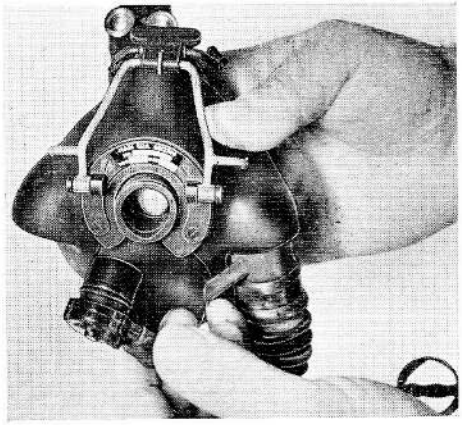

Fig. 20. Microphone pushed out of facepiece

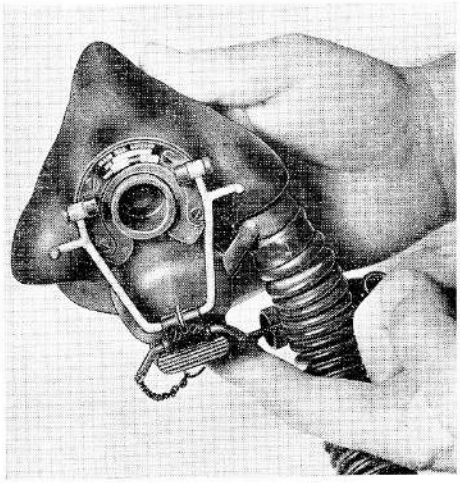

Fig. 21. Microphone removed

49. To refit a microphone proceed as follows:—

(1) Pass the ends of the connector leads through the connector tunnel and locate the cable clamp (Ref. No. 10AR/2582) over the connector. Assemble the clamp to the back of the switch and adjust its position on the connector until the lead terminals are aligned with their respective screw holes, green terminal aligned with the countersunk hole and the black lead terminal with the hole in the centre. Pass the tongue of the cable clamp through the slot and crimp firmly into position.

Note . . .

When assembling the microphone, switch and connector, reference should be made to A.P.2876A, Vol. 1, Sect. 1, Chap. 6.

(2) Locate the large spring contact in the switch body, position the terminal on the green lead and secure the assembly with the screw and nut. Enter the screw from the back of the switch, identifying the correct position by the countersunk hole which receives the head of the screw.

(3) Ensure that the terminal of the black lead is over the centre hole, the terminal of the yellow lead is over the left-hand hole and that the three leads are located in the correct channels.

(4) Assemble the microphone to the back of the switch, aligning the mic. termination 'I' with the yellow lead terminal and mic. termination 'C' (centre) with the terminal of the black lead. Secure the assembly with the two screws, ensuring that the screws pass through the terminals on the leads.

(5) Locate the small spring contact and secure with the third screw. Avoid distorting the switch contacts and ensure that they are correctly positioned.

(6) Fit the cover to the switch, locating the tongue on the body in the cut-out on the edge of the cover. Secure the cover with the two screws.

(7) Check the microphone and switch for correct functioning.

(8) Draw the connector through its tunnel and assemble the microphone to the mask.

(9) Secure the microphone assembly, making one turn of 20 swg (0·036 in. dia.) enamel insulated wire inside the groove round the microphone aperture and twisting the ends together in a tail on the lower side of the assembly.

(10) Re-position the rubber sleeve over the connector. Apply a light coat of Bostik Adhesive 1410 to the inner

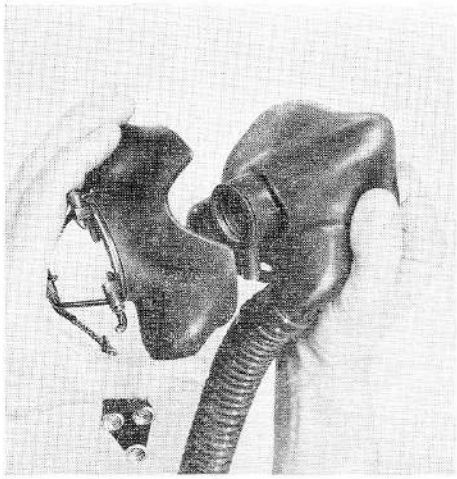

Fig. 22. Removing an exo skeleton and harness

surface of the sleeve which covers the microphone securing wire (sub-para. 9), then locate the sleeve and press firmly into position.

(11) Apply the electrical tests (para. 53 to 55 or 56 to 59 as appropriate).

Removing and refitting a microphone—Q type and PB series masks

50. When it is necessary to remove a microphone, take off the rubber sleeve covering the wire locking, unfasten and remove the wire (fig. 19). Push the microphone out gently from the inside of the facepiece (fig. 20 and 21). If it is required to separate the connector from the microphone assembly, roll back the rubber sleeve clear of the switch terminals, remove the two 8BA terminal screws and washers, and carefully sever the thread binding the cable loom to the switch housing. The lower portion of the rubber sleeve is bonded to the cable with Bostik Adhesive. To re-fit the microphone, place it in position and press it into the facepiece. Re-wire it into position using 0·018 in. dia. locking wire (Ref. No. 30A/3319) before fitting the rubber sleeve. PB series masks are secured by means of 20 swg black oxidised copper wire and the sleeve is attached, at the edges, with Bostik 1410.

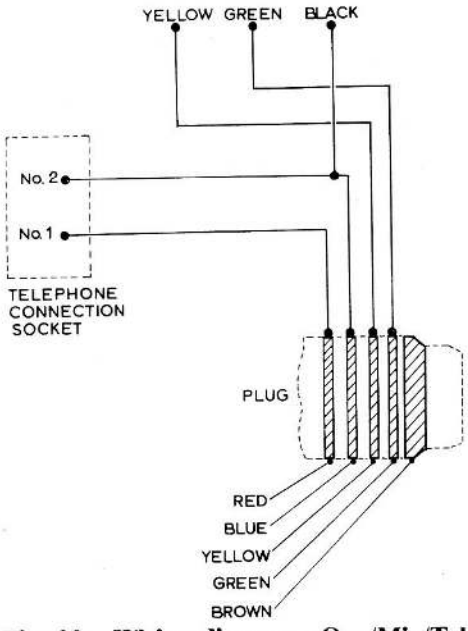

Fig. 23. Wiring diagram—Oxy/Mic/Tel mask hose assembly

Note . . .

The microphone is to be removed before taking off the exo skeleton.

51. If the connector leads have been detached from the switch, reconnect to the switch terminals as described in para. 39, sub-para. (7) and (8), and apply the appropriate electrical tests (para. 53).

Renewing a facepiece

52. The procedure for renewing a facepiece is as follows:—

(1) Remove the inspiratory and expiratory valves in accordance with the instructions contained in para. 43 and 46 respectively.

(2) Remove the microphone and switch assembly as described in para. 48 (P and PA series masks) or para. 50 (Q type and PB series masks).

(3) Separate the exo skeleton from the facepiece (fig. 22).

(4) Slide the rubber slide clear of the breathing hose/mask inlet connection, remove the clip and then remove the hose from the facepiece.

Note . . .

P4 and P4B masks have adhesive tape between the clip and the cable loom.

(5) Remove the inlet connector from the mask inlet connection and assemble to the inlet of the new facepiece so that only the beaded end protrudes.

Note . . .

The inlet connector employed in Q type masks has a bead at both ends.

(6) Assemble the hose to the mask inlet as described in para. 36 (3). For Oxy/Mic/Tel masks (P4, P4B and Q4 masks), reference should be made to para. 39, sub-para. (3) to (6).

(7) Assemble the exo skeleton to the facepiece, then fit the microphone and switch assembly in accordance with the instructions detailed in either para. 49 or para. 50, as appropriate.

(8) Refer to para. 43 and 46, and refit the inspiratory valve, the ice guard and the expiratory valve.

(9) Apply the leakage tests detailed in para. 29 and 30, and either para. 31 or 32 as appropriate.

(10) Apply the load test detailed in para. 37.

(11) Apply the electrical tests (para. 53 or 56 as appropriate).

Electrical tests

Masks not fitted with Oxy/Mic/Tel hose assemblies

53. With the microphone switch in the OFF position, there should be an open circuit between the two main connections of the socket. With the microphone switch set to ON, the resistance between the two main connections of the socket should not exceed 400 ohms or be less than 50 ohms.

54. The insulation resistance between the main connections and the earthing connection on the outside of the socket should be not less than 100 megohms when tested with a supply of 250V d.c. applied for 15 seconds.

55. Connect the mask to a test set, Type 376 (Ref. No. 10S/16328), set the microphone switch to ON and speak into the microphone. Whilst speaking, the GREEN lamp of the test set should glow.

Masks fitted with Oxy/Mic/Tel hose assemblies

56. For the purpose of the insulation and continuity tests, the mask tube plug should be mated with an Oxy/Mic/Tel socket. The Combined Oxygen and Mic/Tel locking socket (Ref. No. 4C/3044) is suitable for this purpose. A wiring diagram for an Oxy/Mic/Tel mask hose assembly is shown in fig. 23.

57. Using a 250V d.c. supply applied for 15 seconds for each test, measure the insulation resistance between individual conductors and between each conductor and the bodies of the mated plug and socket; the minimum acceptable value is 100 megohms.

58. Using a 4V d.c. (max) supply, test the continuity of the Mic/Tel system as follows:—

(a) RED conductor of the socket to No. 1 contact on the telephone socket. The resistance should not exceed 2·5 ohms.

(b) BLUE conductor of the socket to No. 2 contact on the telephone socket. The resistance should not exceed 2·5 ohms.

(c) YELLOW conductor of the socket to the GREEN conductor of the socket. With the microphone switch closed, the resistance should not exceed 400 ohms.

59. Connect the mask to a test set, Type 376 (Ref. No. 10S/16328), set the microphone switch to ON and speak into the microphone. Whilst speaking, the GREEN lamp of the test set should glow.

Life

60. The facepiece of both P and Q type masks may be expected to give a working life of nine months in U.K. and six months overseas. The 'in use' life of the anti-dermatitic (med) facepieces is four months. There is no stated life for the other components which remain in use so long as they satisfy the examination and test requirements or can be made to do so by the renewal of their components.

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