

## Chapter 8

## OXYGEN HOSE ASSEMBLIES

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## Introduction

1. The oxygen mask hose assemblies are lengths of anti-kink hose to be attached to the wearer's flying clothing to make the connection between the main oxygen supply and the oxygen mask tube. They incorporate various fittings to suit the systems installed in the aircraft and are used only in low altitude flight (up to 50 000 ft.).

2. All the oxygen mask assemblies are fitted with a Mk. 7A bayonet socket for coupling to the oxygen plug connector Mk. 7 on the oxygen mask tube. This bayonet socket includes a dog clip for connection to the tube locating D-ring on the life-jacket.

3. The oxygen mask assemblies are of lengths within the range 21 - 23 in. but it is permissible to shorten the hose on initial fitting to suit the individual wearer. All assemblies utilise  $\frac{3}{4}$  in. dia. anti-kink hose.

## DESCRIPTION

**Oxygen mask hose assembly Mk. 1 (fig. 1)**

4. The oxygen mask hose assembly Mk. 1 (Ref. No. 6D/2073) is used with ejection seats to which the fighter type P.E.C. (anti-g connection) is fitted. It comprises the personal component (man portion) of the P.E.C., a length of hose terminating in a bayonet union socket Mk. 7A and a mic-tel connector assembly.

5. The hose is connected to the main oxygen connection on the P.E.C. personal component. The oxygen connection has a transverse steel pin to push open the oxygen supply valve in the seat component of the P.E.C. when the two components are mated. The emergency oxygen supply is fed into the main oxygen hose through the seat component of the P.E.C. and an inward relief and excess pressure valve (Type RV51) mounted on the ejection seat.

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6. Two screwed bushes are provided on the P.E.C. The first is adapted to connect with the A.V.S. connector Mk. 1 or the A.V.S. hose assembly Mk. 3 on the end of the hose from the A.V.S. and the second with the Mk. 1 anti-g suit connector on the end of the anti-g suit hose. Both connectors are provided with knurled clamping rings to engage the screwed bushes on the P.E.C. when the wearer is dressing before flight. Each connector incorporates means for opening the valves to the A.V.S. and anti-G service supplies when the two halves of the P.E.C. are mated.

7. The mic-tel connector is a length of tinsel cord type cable connected to the P.E.C. contact assembly at one end and to a socket Type 626 at the other. The cable is anchored to the P.E.C. by a pair of cable cleats and to the oxygen hose by four strips of Lassovic tape.

#### **Oxygen mask hose assembly Mk. 2 (fig. 2)**

8. The oxygen mask hose assembly Mk. 2 (Ref. No. 6D/2169) is used on pilot ejection seats to which the bomber type P.E.C. (no anti-g connection) is fitted. It comprises the personal component (man portion) of the P.E.C., a length of hose terminating in a bayonet union socket Mk. 7A and a mic-tel connector assembly.

9. The hose is connected to the main oxygen connection on the P.E.C. personal component. The oxygen connection has a transverse steel pin to push open the oxygen supply valve in the seat component of the P.E.C. when the two components are mated. The emergency oxygen supply is fed into the main oxygen hose through the seat component of the P.E.C. and an inward relief and excess pressure valve (Type RV51) mounted on the ejection seat.

10. A screwed bush is provided on the P.E.C. adapted to connect with the A.V.S. connector Mk. 1 or the A.V.S. hose assembly Mk. 3 on the end of the hose from the A.V.S. It is provided with a knurled clamping ring to engage the screwed bush on the P.E.C. when the wearer is dressing. It also incorporates means for operating the valve to the A.V.S. supply when the parts of the P.E.C. are mated.

11. The mic-tel connector is a length of tinsel cord type cable connected to the P.E.C. contact

assembly at one end and to a socket Type 626 at the other. The cable is strapped to the oxygen hose by strips of Lassovic tape.

#### **Oxygen mask hose assembly Mk. 3 (fig. 3)**

12. The oxygen mask hose assembly Mk. 3 (Ref. No. 6D/2173) is used by members of the crew occupying the static seats and whose duties necessitate change of stations in flight. It is provided with the MSC3 type P.E.C. personal component (man portion) which can be connected with the corresponding portion on the static seat or with an MSC5 or MSC105-001 wander lead connector. An emergency oxygen Y-piece connector is introduced to permit connection of the emergency oxygen supply tube from the oxygen bottle (normally carried in the parachute pack), and the hose assembly terminates in a bayonet socket Mk. 7A and a socket Type 626 on the end of the mic-tel connector.

13. The personal component of the P.E.C. has a pistol-grip type handle and the main oxygen connection is through a projecting stem containing a valve which opens, on mating the parts of the P.E.C. The A.V.S. socket at the front of the P.E.C. is designed to receive an A.V.S. hose assembly Mk. 2 on the end of the A.V.S. hose, while dressing. The valve, which opens on mating the two halves of the P.E.C. is contained in this connector.

14. The electrical connector assembly fits into a slot at the back of the P.E.C. and is held in position by two countersunk screws; the cable is strapped to the hose with Lassovic tape.

#### **Oxygen mask hose assembly Mk. 4 (fig. 4)**

15. The oxygen mask hose assembly Mk. 4 is a low altitude assembly used with the fighter type P.E.C. on pilot ejection seats installed in naval aircraft. It is similar to the oxygen mask hose assembly Mk. 1, comprising the personal component (man portion) of the P.E.C., a length of hose, terminating in a bayonet union socket Mk. 7A, and a mic-tel connector assembly.

16. This assembly differs from the Mk. 1 in that the A.V.S. connector on the P.E.C. incorporates a special valve chamber containing the A.V.S. valve which opens when the parts of the P.E.C. are mated. The chamber incorporates a collet

type connector socket to mate with a corresponding adapter (A.V.S. connector Mk. 2) on the end of the A.V.S. connector hose on the suit. The valve chamber has a spring-loaded knurled cap with bayonet-fitting type slots in the sides. On insertion of the suit adapter the cap is pressed down against the spring, clamping the collet around the adapter to ensure a water-tight joint. It is then locked by twisting the cap into the bayonet slots.

17. The anti-g connector bush on the P.E.C. is identical with that on the Mk. 1 assembly and receives an anti-g suit connector Mk. 1 on the end of the anti-g suit hoses. Both A.V.S. and anti-g suit connections are made to the P.E.C. when the wearer dresses.

18. The mic-tel connector is a length of tinsel cord type cable connected to the P.E.C. contact assembly at one end and to the socket Type 626 at the other. The cable is anchored to the P.E.C. by a pair of cable cleats and to the oxygen hose by four strips of Lassovic tape.

#### **Oxygen mask hose assembly Mk. 5 (fig. 5)**

19. The oxygen mask hose assembly Mk. 5 (Ref. No. 6D/2567) is used by members of the crew occupying the static seats and whose duty it is to move stations in flight. It is designed to be used with the demand emergency oxygen regulator stowed in the parachute assembly. It is almost identical with the assembly Mk. 3 except that an emergency oxygen connector is used suitable for connection of the demand emergency oxygen regulator, in the parachute pack.

20. The MSC3 personal component (man portion) can be connected with the corresponding portion on the static seat or with an MSC5 or MSC105-001 wander lead connector. A demand emergency oxygen shut-off valve assembly (Y-piece) is introduced into the hose which terminates in a bayonet socket Mk. 7A and a socket Type 626 on the end of the mic-tel connector.

21. The personal component of the P.E.C. has a pistol-grip type handle and the main oxygen connection is through a projecting stem containing a valve which opens on mating the parts of

the P.E.C. The A.V.S. socket at the front of the P.E.C. is designed to receive an A.V.S. hose assembly Mk. 2 on the end of the A.V.S. hose, while dressing; the valve, which opens on mating the parts of the P.E.C., is contained within this.

22. The electrical connector assembly fits into a slot in the back of the P.E.C. and is held in position by two countersunk screws; the cable is anchored to the hose in three places with Lassovic tape.

#### **Oxygen mask hose assembly Mk. 7 (fig. 6)**

23. The oxygen mask hose assembly Mk. 7 (Ref. No. 6D/2854) is a low altitude assembly used by members of the crew occupying pneumatically assisted swivel seats. It incorporates the M.L. quick-release oxygen connector for coupling directly to an oxygen supply wander lead in the aircraft which enables the crew members to sit in the seat or leave it without disconnection. It comprises two lengths of hose connected to a demand emergency oxygen shut-off valve assembly and terminating in a bayonet union socket Mk. 7A.

24. The mic-tel connector assembly, which is strapped to the hose with Lassovic tape, has a socket Type 626 at one end and a plug, Type 671 at the other.

#### **Combined oxygen and mic-tel seat hose assembly (fig. 7)**

25. This hose assembly is fitted to the parachute harness in certain aircraft equipped with a combined oxygen and mic-tel demand oxygen system. In this system, the mic-tel leads are attached to the oxygen hose and the electrical terminations are incorporated in the oxygen connectors so that these must be connected correctly before radio communication can be established. A description of the system will be found in A.P.1275G, Vol. 1 (2nd Edn.) Part 1, Sect. 1, Chap. 1.

26. The hose assembly consists of a 19 in. length of  $\frac{3}{4}$  in. i.d. anti-kink hose, a plug assembly which mates with a floor socket (A.P.1275G, Vol. 1 (2nd Edn.), Part 2, Sect. 3, Chap. 8), a locking socket assembly which receives the oxygen mask tube plug, and an electrical cable.

The cable is wound in a 3-turn spiral round the hose and is secured to the hose by four rubber rings. For information concerning anti-kink hose, reference should be made to A.P.1275G, Vol. 1 (2nd Edn.), Part 2, Sect. 3, Chap. 10.

27. A protective cap (Part No. OP.18042) is provided to seal the plug assembly when disconnected from the floor socket, and a cap (AGS 597/A) is required to seal an emergency oxygen connection on the locking socket when the hose assembly is removed from the aircraft.

#### *Plug connector*

28. The plug connector comprises a plug assembly fitted with a skirt, an adapter, a hose connection, a valve assembly and a rubber shroud. The valve assembly is housed within the hose connection and functions as a non-return valve, allowing oxygen from the main supply to pass into the hose assembly when the assembly is connected to the floor socket, and preventing the escape of emergency oxygen from the hose if the aircraft should be abandoned. The adapter is screwed on to the end of the plug assembly and the hose connection is screwed into the end of the adapter. Both screwed attachments are sealed with varnish (DEF.32-2) and locked by grub screws; these, in turn, are locked with nylon cement.

29. The adapter is of nylon and the hose connection of light alloy. Attachment of the hose connection to the anti-kink hose is by means of a 6 t.p.i. thread which screws into the hose corrugations. The skirt is secured to an outer collar of the plug assembly by screws sealed with varnish and locked by filling the counter-sunk cavities in the skirt with locknut cement (Ref. No. 33H/58). The forward end of the shroud is located by these screws, the shroud extending rearwards to encase the electrical terminations and the connection between the plug assembly and the hose.

30. *Plug assembly.* The plug assembly is constructed round a manganese brass body. The forward end of the body is fitted with a nylon bush, while an insulating collet assembled to the body carries four contact rings, these being separated by insulating rings. Extending rearwards from each contact ring is an insulated wire through which connection is made with the mic-tel cable. The contact rings and insulating rings are located by an inner collar, and an

outer collar serves as a plug stop. The sub-assembly is retained by a locking ring which is screwed onto the rear end of the body and threaded externally for attachment of the adapter.

31. *Valve assembly.* The valve assembly is housed within the hose connection and consists of a cylindrical valve seat and a valve flap. The face of the valve seat is cut obliquely into the cylinder diameter from opposite sides, forming two parabolic seatings at 60°. The valve flap is moulded to mate with the seatings and is located by a pin passing diametrically through the valve seat. Two stop pins fitted to the valve seat restrict the flap movement in the reverse flow direction.

#### *Locking socket assembly*

32. The socket of the assembly is of an insulating material and carries six contacts spaced equidistantly round the side. The upper ends of the contacts are turned inwards and protrude, through slots, into the bore of the socket. The lower ends are secured to the socket insulating bushes by screws which are also employed to secure the socket to a housing. Below the screws, the ends of the contacts provide terminations for the leads of the mic-tel cable, the leads being soldered to the contacts.

33. An inner sleeve is located between the flanges round the socket, while an outer sleeve extends above the socket and has two bayonet slots. A spring biased slide surrounds the outer sleeve and is retained by two pins which are screwed into the sleeve and locked with Araldite. Slots in the slide permit movement against the spring and the spring load is transmitted, through a thrust sleeve, to a stop. The stop surrounds the lower portion of the socket and is secured by two special screws.

34. The housing is of light alloy and incorporates a hose connection which is at 45° to the centre line of the assembly. This connection is similar to that employed in the plug connector and screws into the corrugations of the anti-kink hose. An insulator located between the flanges insulates the housing from the adjacent mic-tel terminations, while an O-ring located between the crown of the housing and a flange within the socket, provides a seal when the mask tube plug is connected to the socket.

35. Mounted on one side of the housing is a valve body sub-assembly which has a  $\frac{1}{8}$  in. B.S.P. inlet connection, and houses a relief valve and a non-return valve. The inlet connection is for an emergency oxygen supply and the relief valve opens if the pressure of this supply exceeds approximately 10 in. w.G. The non-return valve prevents oxygen from the main supply passing into the emergency oxygen line.

36. Protection for the electrical terminations is afforded by a rubber shroud having a moulded lip which is located in a channel round the exterior of the stop. A cable clamp secures the mic-tel cable to the front of the housing, while a plate mounted on the rear face is secured to the parachute quick-release box when the hose assembly is installed.

#### *Installation*

37. *Pre-installation checks.* Prior to installing the hose assembly, the plug of the assembly should be connected to the floor socket and a check made on the load necessary to effect separation. The load must be applied axially and should be between 28 and 62 lb.

38. *Installation procedure.* The hose assembly is to be installed in accordance with the instructions contained in the relevant aircraft publication and must satisfy the following conditions:—

- (1) There must be sufficient slack hose between the floor socket and the split clamp on the parachute harness to allow for raising and lowering the seat.
- (2) The locking socket should rest naturally flat against the user's chest and the mic-tel cable must not be trapped.
- (3) A check must be made to ensure that the hose assembly does not foul the aircraft structure when the seat is moved through its ejection path.
- (4) The pressure drop between the floor socket and the upstream side of the mask tube plug must not exceed 0.8 in. w.G. when the assembly is passing a flow of 100 litres/min.

- (5) The slip rings of the plug connector must be wiped with a lint-free cloth before the plug is connected to the floor socket.

39. *Post-installation tests.* The following tests are to be applied after the hose assembly has been installed in an aircraft:—

- (1) Ensure that the sliding sleeve of the locking socket functions correctly when the mask tube plug is connected to, and disconnected from, the locking socket.
- (2) Check that the mask tube plug can be connected and disconnected without difficulty. When connecting the mask tube plug for the purpose of this check, movement of the slide and the locking operation should be accomplished in one action; when disconnecting, however, the slide must first be moved backwards.
- (3) Connect the plug assembly to the floor socket and press in fully. Disconnect and reconnect the assembly, two or three times and check that the operations are unrestricted.
- (4) Check that the plug assembly can be rotated when connected and locked in the floor socket, and that the mask tube plug can be rotated when connected and locked in the locking socket.
- (5) Connect an oxy-mic-tel mask (Type P4 or Q4) to the locking socket, switch on the communications equipment, and receive and repeat a standard speech sentence, checking the quality of speech while manipulating the joints of the assembly.

## SERVICING

### Mask hose assemblies

40. Permissible repair of the oxygen mask hose assemblies includes:—

- (1) Renewal of the oxygen hose if it becomes damaged.

- (2) Renewal of the mic-tel connector assembly.
- (3) Renewal of the sealing rings around the orifices on the under face of the fighter and bomber type P.E.C.s.

No attempt may be made to remedy any fault developing in a fitting such as a valve assembly. The complete component must be removed and a replacement fitted.

#### *Renewing the oxygen hose*

41. (1) Remove the Lassovic tape from the hose assembly, releasing the mic-tel connector.
- (2) Draw the damaged piece of hose off the spigots of the fittings to which it is connected.
- (3) Cut a new length of  $\frac{3}{4}$  in. anti-kink hose and re-attach to the fittings. To ease assembly Silicone grease MS33 (Ref. No. 34B/9100519) may be used on the FITTINGS ONLY - NOT on the hose.
- (4) When connecting to the fittings the distance from the end of the hose to the wall or stop of the fitting must not exceed  $\frac{3}{8}$  in.
- (5) Re-attach the mic-tel cable assembly to the hose using Lassovic tape.

#### ◀ *Re-connecting a hose*

42. When a hose has been removed or has pulled off, it may be re-connected under the following conditions:-

- (1) The hose remains serviceable in all respects.
- (2) The length used for the original connection is cut off.
- (3) After having been shortened, it remains long enough for its original purpose. ▶

#### *Renewing the mic-tel cable assembly*

43. Faulty mic-tel cable assemblies on the MSC3 type P.E.C.s and the M.L. quick-release connector require total renewal, including the electrical contact assembly. On the fighter and bomber type P.E.C. a new assembly, comprising the socket Type 626 and cable only, may be used to reconnect to the existing electrical contact on the P.E.C.

44. The procedure is:-

- (1) Remove the Lassovic tape from the oxygen hose assembly and release the cable.
- (2) If the assembly to be renewed is on a fighter or bomber type P.E.C. unscrew the gland nut and withdraw the thrust washer, tapered ferrule and other washers. If the assembly is on an MSC3 type P.E.C. take out the two screws attaching the electrical contact assembly to the P.E.C. and remove the cable and contact assembly complete.
- (3) On fighter and bomber types: remove four 4 B.A. countersunk screws and take off the cap to expose the electrical connections. Examine the soldered connections for broken or poor contacts and repair as necessary (see note).
- (4) To fit a new assembly to the bomber or fighter types remove the existing connections. Thread the gland nut, ferrule, washers and cap on the end of the replacement assembly in correct order.
- (5) Solder the cores of the new cable to the P.E.C. connector pins.

#### **Note . . .**

*The cable cores are of the tinsel cord type, requiring special soldering technique by a skilled electrical tradesman.*

- (6) If the assembly is of the MSC3 type attach a new connector assembly, using the screws removed in operation (2). On both types of assembly strap the cable to the oxygen hose with Lassovic tape in the appropriate places.

#### **Combined oxygen and mic-tel seat hose assembly**

45. If the hose assembly fails any of the tests described under para. 47, or if on examination some part is found to be defective, the assembly is to be disposed of in accordance with current authorised procedure.

46. In order to apply the servicing checks to demand oxygen regulators employed in combined mic-tel systems, a test adapter (Ref. No. 6C/3194) is required to connect the metering tube (Ref. No. 6C/1308) or the suction tube (Ref. No.

6C/1015) to the socket of the hose assembly. For further details concerning this test adapter, reference should be made to A.P.1275T, Vol. 1, Sect. 6, Chap. 17.

#### Testing

47. The tests should be applied before the assembly is installed in an aircraft, when the serviceability of the assembly is in doubt and at the appropriate examination periods at Equipment Depots.

48. Test Equipment. The test equipment required is as follows:—

- (1) Breathing oxygen test supply.
- (2) Pressure gauge, 0 to 5 lb/in<sup>2</sup>.
- (3) Flowmeter, 25 to 500 cm<sup>3</sup>/min. (Ref. No. 6C/3150).
- (4) Differential pressure chamber, Mk. 1 or 1A (Ref. No. 6A/1455 or 6A/1649).
- (5) Tubular spring balance capable of reading to 70 lb.
- (6) Scales capable of reading to 25 lb.
- (7) Tester, insulation resistance, Type C.
- (8) Test plug (para. 49).
- (9) Floor socket (Ref. No. 6D/2576), Type G helmet, Type P4 or Q4 oxygen mask and suitable amplifying equipment.

49. Details of a suitable test plug (Item 8), will be found in A.P.1275G, Vol. 1, (2nd Edn.), Part 2, Sect. 3, Chap. 14, App. 1.

50. Particulars of tests. Testing must be carried out at normal room temperature and pressure, and the test gas must be breathing oxygen. Soap solution for leak testing is to be prepared from soft soap J.S. Cat. No. 6505/99/210/1935. Precautions must be taken to prevent the solution entering the assembly, and all traces of the solution must be removed when the tests are completed.

#### WARNING . . .

Many materials, particularly oil and grease, are subject to spontaneous combustion when exposed to undiluted oxygen under pressure. Precautions

must be taken therefore, to exclude oil, grease, dust and metal particles from the hose assembly and the test equipment.

51. *Functional tests.* Apply the tests detailed in para. 39, sub-para. (1), (2), (3) and (4).

52. Connect the socket assembly to the test plug by pressing the assembly on to the plug while the plug rests on scales. The load necessary to depress the slide and effect connection should not exceed 22 lb. Draw the slide of the locking socket fully back, hook the spring balance on to the loop of the test plug and then separate the components using the spring balance. The load should not exceed 22 lb.

53. The pull-off load for the plug of the hose assembly should be between 28 and 62 lb. Details of the equipment required for this test and the test procedure will be issued later.

54. *Leak test.* Fit the test plug to the locking socket and the floor socket to the hose plug connector. Place the hose assembly in the test chamber, connect the pressure line to the inlet of the floor socket and close the chamber door. Connect the 25 to 500 cm<sup>3</sup>/min. flowmeter to a static connection of the chamber, blank the remaining static connection and connect the 0 to 5 lb/in<sup>2</sup> pressure gauge to the pressure connection. Apply a pressure of 3.0 lb/in<sup>2</sup> to the assembly and check the leakage indicated by the flowmeter; the leakage should not exceed 150 cm<sup>3</sup>/min. Release the pressure and disconnect the hose assembly from the chamber.

55. *Electrical insulation test.* Connect the test plug to the locking socket and the plug assembly to the floor socket. Check the insulation resistance between each conductor of the assembly, and between each conductor and the body of the floor socket. Using a 250V D.C. supply applied for 15 seconds, the insulation resistance in each case should be not less than 100 megohms.

56. *Continuity test.* Using a maximum supply of 4V D.C., and with the assembly connected to the test plug and the floor socket, check the resistance of each conductor. The resistance should not exceed 0.5 ohms.

57. *Speech test.* Apply the speech test detailed in para. 39, sub-para. (5).

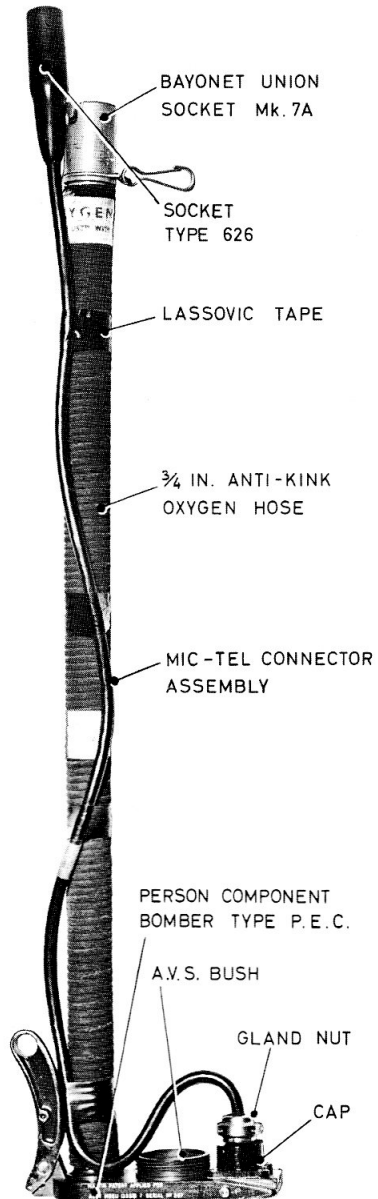
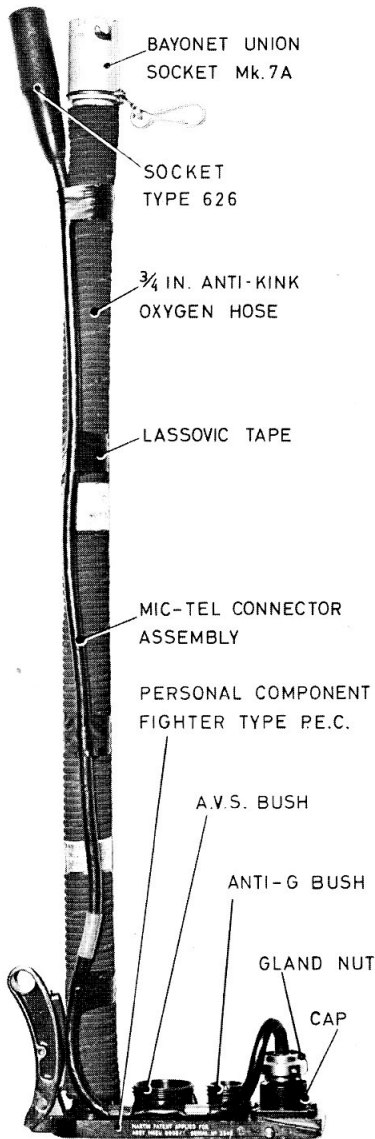


Fig. 1. Oxygen mask hose assembly Mk. 1

Fig. 2. Oxygen mask hose assembly Mk. 2



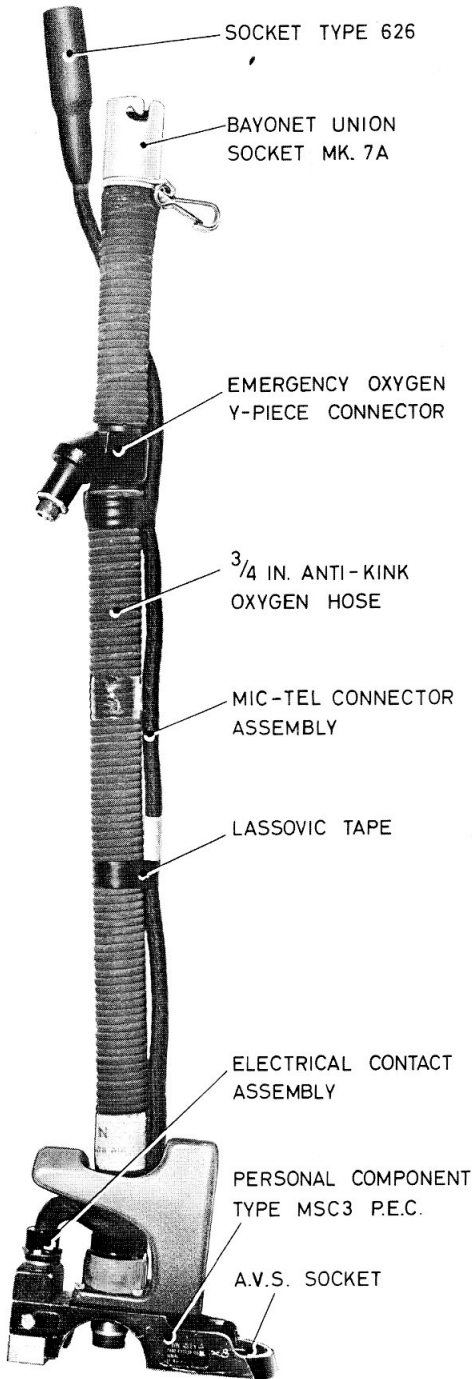


Fig. 3. Oxygen mask hose assembly Mk. 3

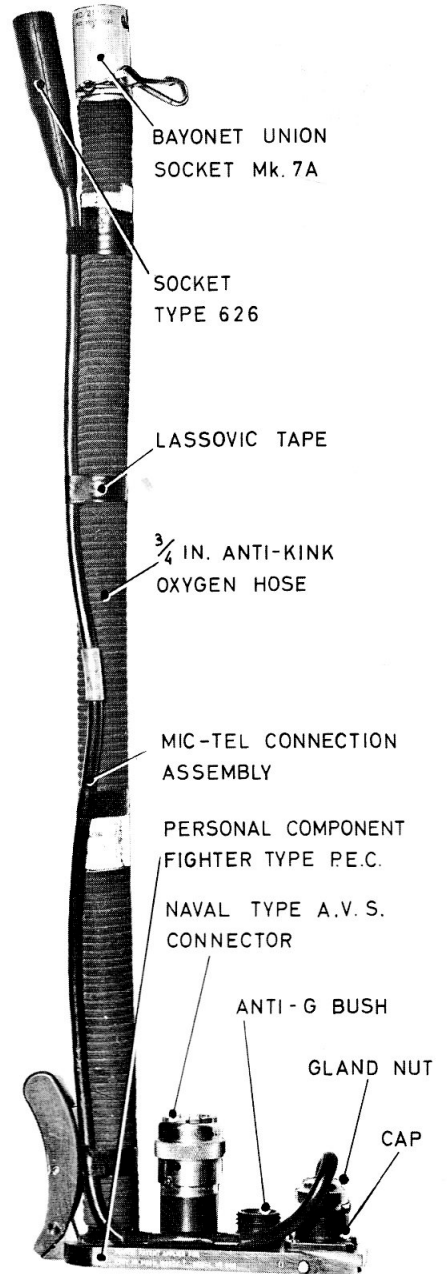


Fig. 4. Oxygen mask hose assembly Mk. 4

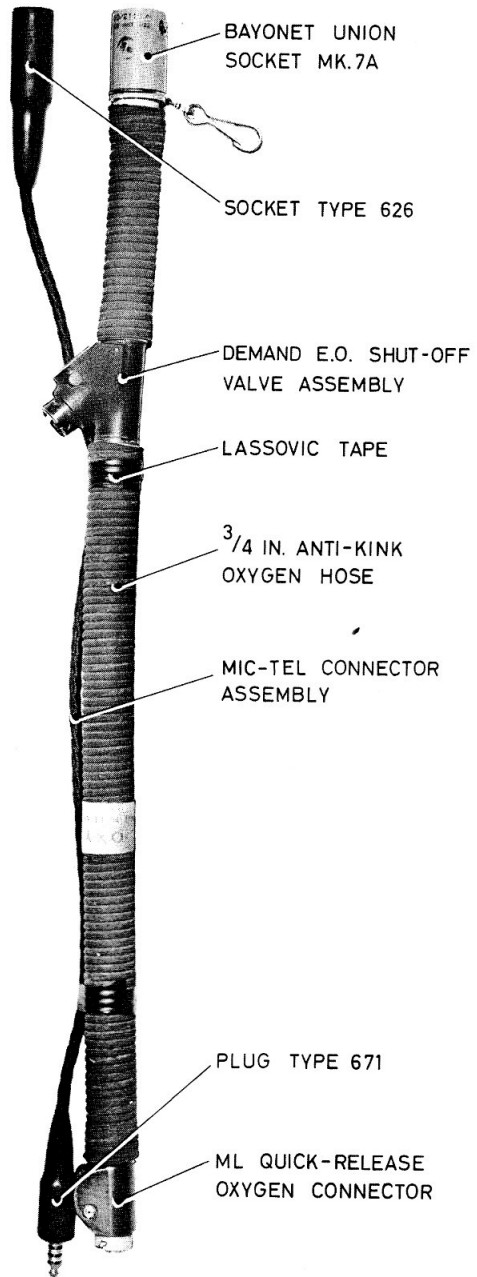
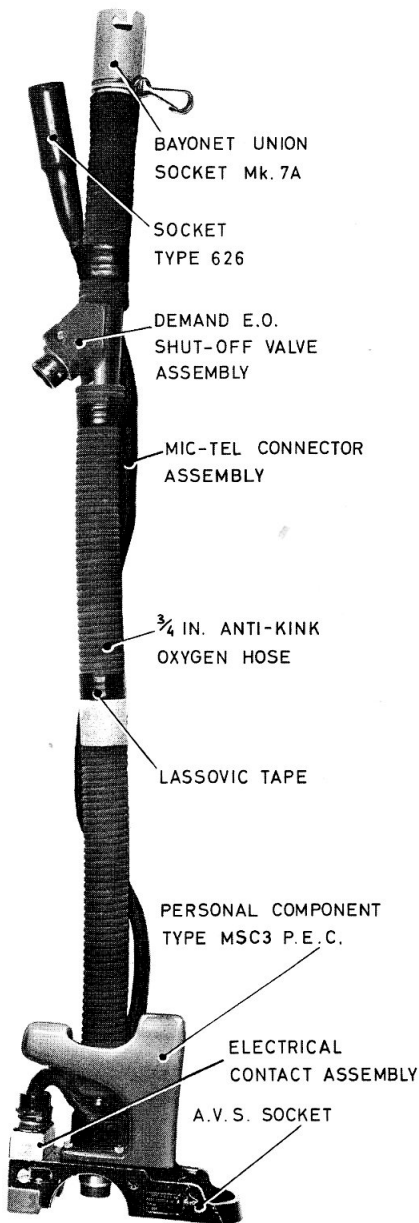


Fig. 5. Oxygen mask hose assembly Mk. 5

Fig. 6. Oxygen mask hose assembly Mk. 7

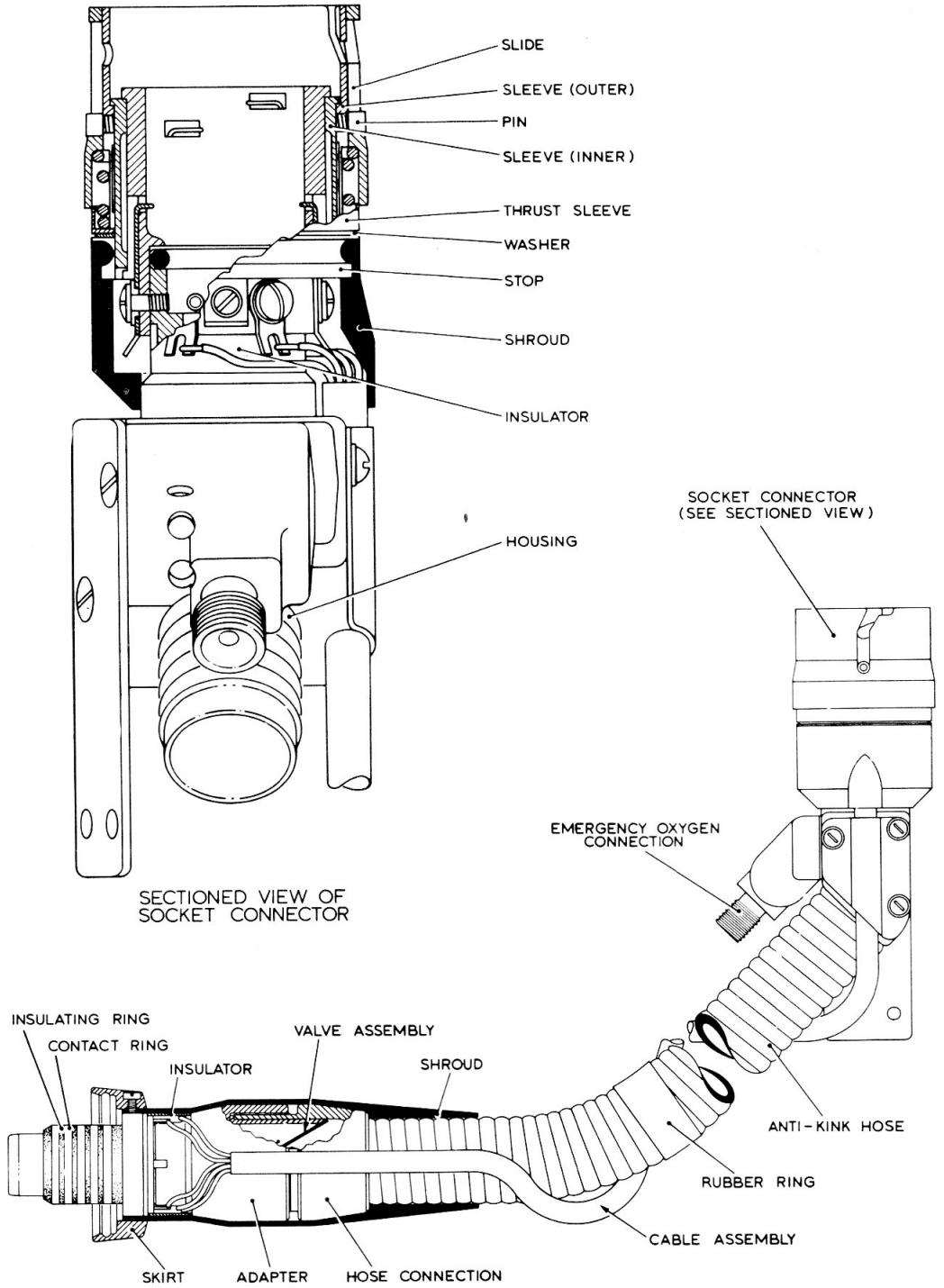


Fig. 7. Combined oxygen and mic-tel seat hose assembly

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