Chapter 5
(Completely revised)

PERSONAL EQUIPMENT CONNECTOR
(Martin-Baker ejection seat type)

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

Introduction

1. The personal equipment connector (P.E.C.) is designed to couple and uncouple aircrew service lines to and from the appropriate aircraft supplies by a single action in each instance. On ejection, all services (except the emergency oxygen) are both disconnected and sealed off automatically.

2. Two types of P.E.C. are in service use, one suitable for fighter aircraft and the other for bombers. They are basically similar, but the bomber type does not include an anti-G suit supply line and is therefore slightly shorter. In addition, the air ventilated suit connector is of a larger bore in the bomber type. For the purpose of description, therefore, only the fighter type will be considered in this chapter. Both types are available as high or low altitude variants.

LOW ALTITUDE TYPE

General description

3. Five services are provided in the fighter P.E.C. as follows :—

(1) Tel/Mic., (with visor release and electrical heating for the exspiratory valve).
(2) Anti-G suit supply
(3) Air ventilated suit supply
(4) Main oxygen supply
(5) Emergency oxygen supply

4. The personal equipment connector (*fig.* 1 and 2) consists of three main parts — the aircraft component, the seat component and personal (or man) component. The aircraft component remains in the aircraft at all times and is attached to the supply services by anti-kink hose. All services in this portion are provided with valves which shut automatically on disconnection. The object of this is to prevent the oxygen and air supplies from wasting to atmosphere and so reducing the supplies to other crew members. The Tel/Mic. contact is also broken when the components are separated and this is effected by a short static line anchored to the aircraft floor. As the ejection seat ascends the guide rail, the static line pulls the operating lever which retracts the plunger and so allows the aircraft component to fall away ; no action is required by the seat occupant.

5. The seat component is bolted to the starboard side of the seat pan and need only be removed for bay servicing. All services are provided with inner and outer connecting valves which close when either the aircraft or the personal components are removed. The contacts for the Tel/Mic. and electrical services are sunk beneath the surface to minimize the risk of a short circuit when connecting or disconnecting the personal component.

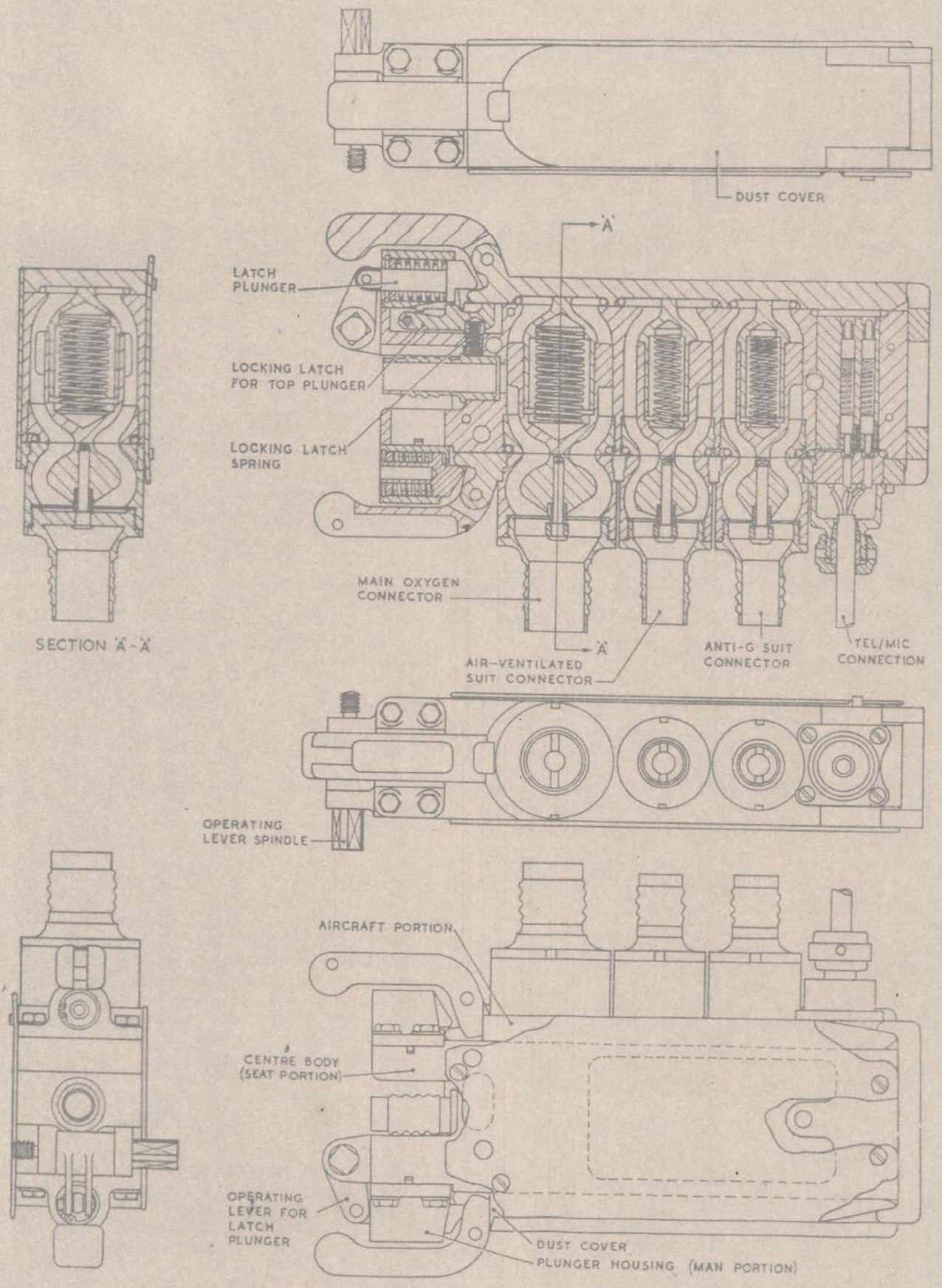

Fig. 1. Details of aircraft and seat components (with dust cover)

6. The personal component (*fig.* 2) forms part of the flying clothing and is only connected to the seat component when the occupant fits his equipment prior to a sortie. On ejection, the personal component remains attached to the seat component until separation by the time-release unit or by the manual over-ride control. Before leaving the seat after completing a sortie, the occupant disconnects the personal component as described later. In this component, the air ventilated suit supply is the only service which embodies an automatic valve. This is provided to prevent the ingress of water should the occupant be forced to alight in the sea.

7. The anti-G suit and air ventilated suit connections in the personal component are detachable by unscrewing the knurled rings. This is done for two reasons :—

(1) To facilitate dressing, as the occupant has to feed these two service lines through his flying clothing.

(2) Should the occupant wish to fly without making use of either of these services.

8. A dust cover is provided for the seat component to obviate the risk of damage to the valves when the occupant vacates the seat. During flight, the dust cover is stowed on the starboard side of the seat pan.

9. To prevent seepage of oxygen or air to atmosphere when the valves are open (i.e., all three components are connected) rubber O-rings are provided in the lower parts of the seat and personal components. A Hymatic inward relief and excess pressure valve mounted on the starboard side of the seat to the rear of the P.E.C. completes the assembly.

Aircraft component

10. This consists of a flat body into which is screwed the valve assemblies for the appropriate oxygen and air services. Forward of these valves is a housing for the six electrical contacts. At the rear is the operating lever connected to the aircraft floor by a static line. To ensure exact location in the seat component, a small locating peg is embodied on the starboard side of the body which fits into a slot in the outer side plate of the seat component, thus ensuring positive connecton of all services.

11. Each valve assembly consists of a valve body into which is screwed an anti-kink hose inlet connector of the appropriate size. For the fighter type of P.E.C., the main oxygen connector is of $\frac{7}{8}$ in. bore. The air ventilated suit and anti-G suit connectors are each of $\frac{5}{8}$ in. bore. Inside the bodies are spring-loaded valves which close automatically upon separation and open automatically upon being connected.

12. The six beryllium-copper electrical contacts are moulded into an insulator and housed in an assembly attached to the body by four cs/hd. screws. The cables themselves are gripped by tightening a knurled ring.

Seat component

13. This is bolted to the starboard side of the seat pan and consists of a main block which houses inner and outer connecting valves for the various services. Each valve consists of an inner and outer spring-loaded valve and is designed to close automatically on separation of the components. The seating of the inner valves form an integral part of the main block, but the seatings of the outer valves are separate to facilitate assembling. Ported into the main oxygen supply chamber at the rear of this component is the emergency oxygen supply inlet connector suitable for $\frac{1}{2}$ in. bore anti-kink hose. Forward of the double connecting valves is the centre body for the electrical contacts ; both upper and lower faces are provided with rubber O-rings for sealing purposes. Screwed to the front of the seat component is the clamp plate which consists of a steel plate with four lugs fitting over the tapered ends of the other components to secure them in their respective positions ; the side outer plate is slotted at the top and bottom to accommodate their respective locating pegs.

14. Bolted to the aft end (immediately below the emergency oxygen connector) is the aircraft component retaining plunger housing. This contains a plated steel spring-loaded plunger held in position by a support collar and a circlip. This plunger is depressed by pulling on the operating handle, so ejecting the aircraft component.

15. Above the emergency oxygen connector is the personal component plunger housing, locking latch and operating lever spindle. The plunger is connected to the automatic mechanism by a rod. By operating the manual over-ride lever the plunger is retracted (so disconnecting the personal component) and simultaneously the leg restraining cords and combined harness are freed. When the occupant leaves the seat after a sortie and disconnects the personal component, the plunger is prevented from moving forward by the locking latch ; hence the leg restraining cords are freed without affecting the locking mechanism of the combined harness.

Personal component.

16. This portion (being part of the occupant's flying clothing) is only connected to the seat component when he is seated in the aircraft. It consists of a flat body into which are connected the various services. The main oxygen connector remains connected to the oxygen pipeline at all times and actuation of the valve in the seat component is achieved by a steel pin inserted just below the surface of the personal component ; this depresses and thus opens the valve when the seat and personal portions are connected. A similar pin actuates the seat component and anti-G suit valve.

17. The remaining arrangements in respect of the electrical contact housing, locating peg, etc. are very similar to the seat component except that the electrical contacts are proud in order to mate with the sunken contacts in the seat portion. The

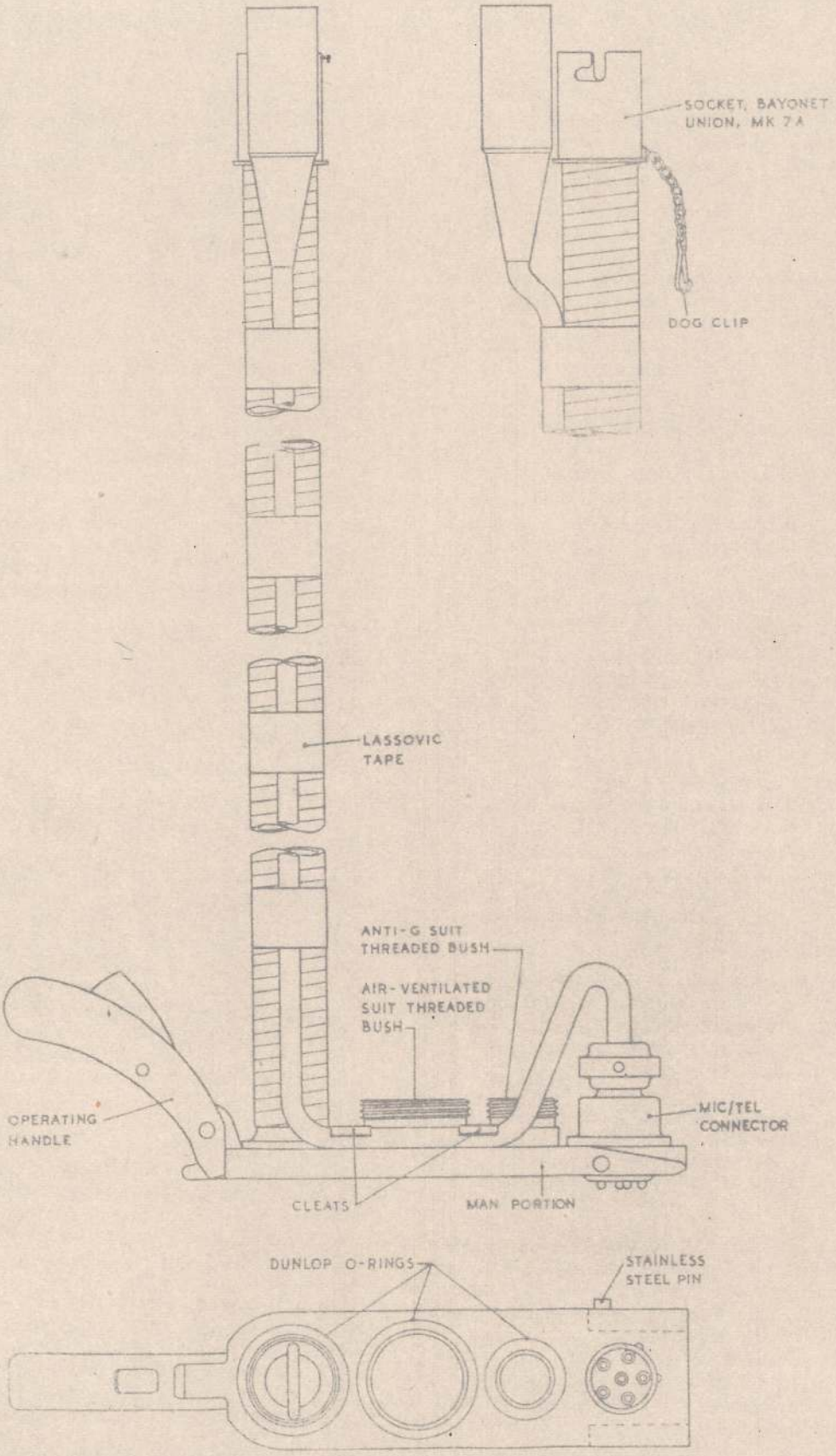

Fig. 2. Details of personal component (low altitude)

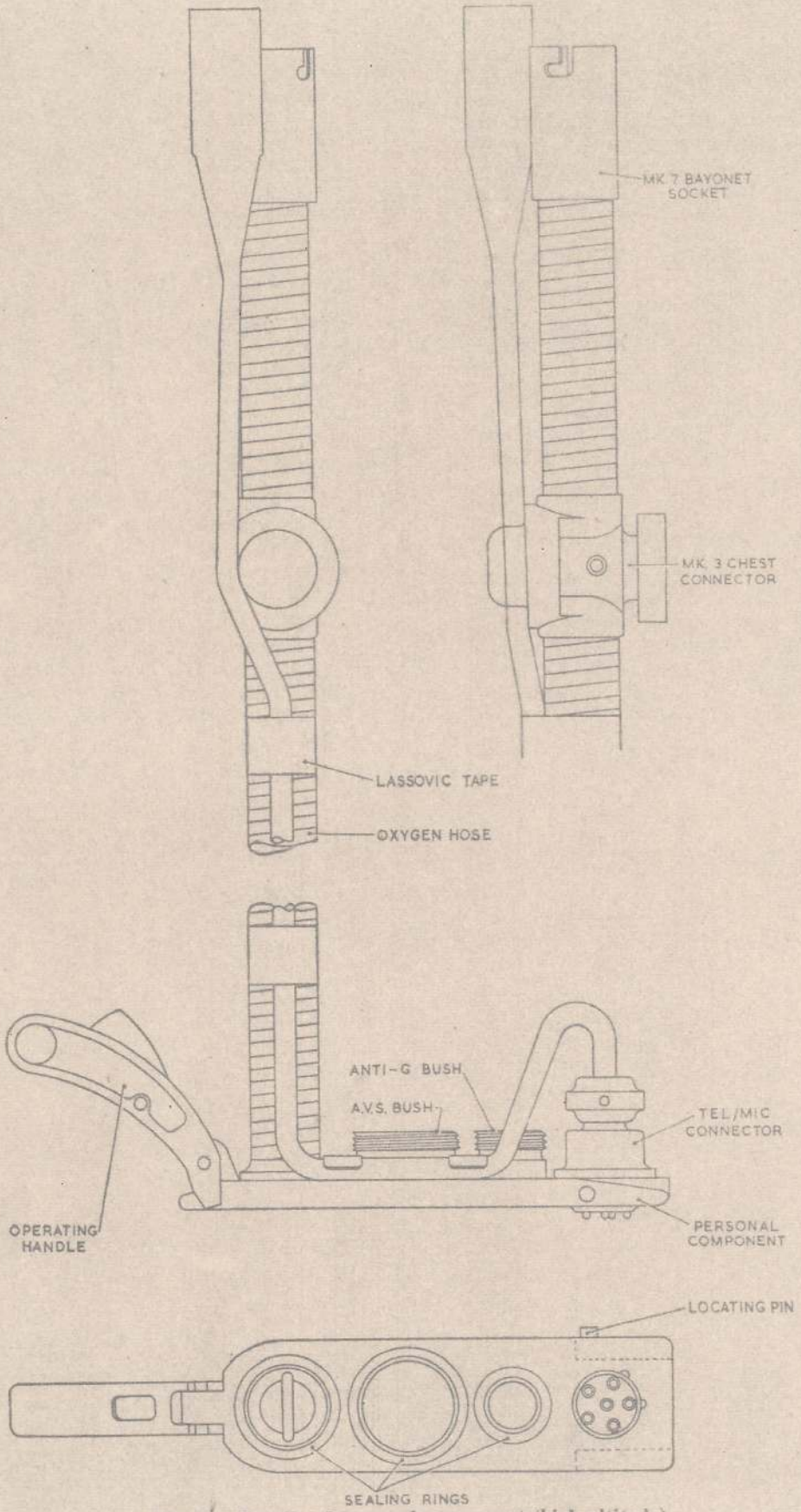

Fig. 3. Details of personal component (high altitude)

operating handle is again provided with a button release to prevent accidental disconnection by knocking the lever forward.

Hymatic valve

18. This is situated between the emergency oxygen supply bottle and the inlet connector at the rear of the seat component. It is a Hymatic valve, Type R.V.51, bolted to the starboard side of the seat pan and is coupled to the inlet connector by $\frac{1}{2}$ in. anti-kink hose. Full details will be found in Chap. 6.

HIGH ALTITUDE TYPE

General description

19. The high altitude type of P.E.C. is basically similar to the one previously described; the aircraft and seat portions are similar but the personal component (*fig.* 3) incorporates a Mk. 3 chest connector in the oxygen hose. This is connected to the pressure jerkin for the purpose of applying pressure to the seat occupant's trunk and also acting as an oxygen reservoir.

Connecting the personal component

20. (1) Don the air ventilating and anti-G suits in the normal manner and feed the service lines through the flying clothing prior to connecting to the personal component by screwing up the appropriate knurled rings. The oxygen feed hose to the mask and Tel/Mic. leads remain connected to the personal component at all times.

(2) Enter the aircraft and remove the dust cover from the seat portion by moving the operating handle in an upwards direction. Place the dust cover in its stowage on the starboard side of the seat pan.

(3) Place the personal component in the seat component, ensuring that the locating pin fits into the slot on the outer side plate and that the tapered end fits under the clamp plate lugs. Push down the operating handle until the plunger is released, thus securing the personal component in position.

(4) Check for correct assembly by jerking upwards on the oxygen feed hose. If connection has not been properly made, the personal portion will come away from the seat portion with very little resistance. An alternative method of checking is to use the Tel/Mic. If speech is audible, then connection has been made correctly.

Disconnecting the personal component

21. (1) Depress the thumb button in the centre of the personal portion operating handle and move the handle in an upwards direction, thus ejecting it from the seat portion and also freeing the leg restraining cords.

(2) Remove the dust cover from its stowage on the starboard side of the seat pan and connect it to the seat portion by locating it in the correct position and depressing the operating handle.