

## Chapter 15

## AIR VENTILATED SUITS, Mk. 2 and 2A

## LIST OF CONTENTS

	Para.		Para.
<i>Introduction</i> .....	1	<i>Servicing</i> .....	
<i>Description</i> .....	2	<i>Examination and testing</i> .....	9
<i>Sizes</i> .....	4	<i>Fitting the connector to a Mk. 2A suit</i> .....	10
<i>Handling</i> .....	6	<i>Repairs</i> .....	12
<i>Storage</i> .....	7	<i>Prevention of irritation</i> .....	13
		<i>Cleaning</i> .....	17

## LIST OF TABLES

Sizes	Table
.....	1

## LIST OF ILLUSTRATIONS

	Fig.		Fig.
<i>Air ventilated suit, Mk. 2: front view</i> .....	1	<i>View of manifolds and tubes</i> .....	3
<i>Air ventilated suit, Mk. 2: back view</i> .....	2		

**Introduction**

1. Air ventilated suits are provided to afford relief from the discomfort of high cockpit temperatures by conveying moving air to the wearer's skin through the medium of a number of tubes terminating in jets so located that the flow of air is ducted to all parts of the body and limbs. The tubes are laid out as a simple circulatory system, main arterial tubes conveying air to manifolds from which smaller, more numerous tubes enable it to flow to the various parts of the body and limbs. Fig. 1 and 2 show the front and back of a suit and fig. 3 an enlargement of part of the circulatory system. The suits are intended to be worn either next to the skin or over a string vest and underpants. The actual size of the suit selected for use is of less importance than the comfort it provides and this should be the main consideration when deciding on the size required.

**Description**

2. The suit is a simple garment made of nylon which fastens by means of tapes which tie at the wearer's back. The arms and legs are full length, extending to the wrists and ankles; the legs being fitted with buttons and tabs by which the bottoms of the legs are fastened round the wearer's ankles. Tubes are made of P.V.C.

3. The tubes are routed through tunnels

made by sewing strips of material to the suit. Commencing at a large inlet tube the system divides into five smaller tubes in the centre of the wearer's chest. These secondary tubes run to an inner system of manifolds located on the chest and sides of the wearer and then to an outer system on his legs. From each manifold the small tubes which convey the air to the skin emerge in groups, one group from each side of each manifold. Each group on the chest and sides consists of eight tubes and those on the legs of six, giving a total of 144 tubes in the system. The internal diameter of the small tubes is 2mm. and the total capacity of the system is 14 lb./in.<sup>2</sup> at 1.5 cu.ft./min. pressure. The difference between the Mk. 2 and Mk. 2A suits is that the Mk. 2 suit is complete with a standard length inlet hose fitted with a connector but the Mk. 2A suit has a longer length of hose without a connector. The hose has to be cut to length and an appropriate connector fitted at Unit level.

**Sizes**

4. Suits are made in six sizes suitable for wearer's whose body dimensions are as listed when taken over the shirt and trousers and wearing no shoes.

**Note . . .**

The weight is given as a guide to those who have other body dimensions above average for

TABLE 1  
SIZES

Mk2 Ref. No. 22C/	Mk2A Ref. No. 22/C	Size	Height	Chest	Waist	Weight (in lb. without jacket or shoes)
1733	1856	1	5 ft. 1 in. to 5 ft. 6 in.	Less than 38½ in.	Less than 33 in.	Less than 150 lb.
1734	1857	2	5 ft. 1 in. to 5 ft. 6 in.	Over 38½ in.	Over 33 in.	Over 150 lb.
1735	1858	3	5 ft. 6 in. to 5 ft. 11 in.	Less than 39½ in.	Less than 34½ in.	Less than 170 lb.
1736	1859	4	5 ft. 6 in. to 5 ft. 11 in.	Over 39½ in.	Over 34½ in.	Over 170 lb.
1737	1860	5	5 ft. 11 in. to 6 ft. 4 in.	Less than 41 in.	Less than 35½ in.	Less than 190 lb.
1738	1861	6	5 ft. 11 in. to 6 ft. 4 in.	Over 41 in.	Over 35½ in.	Over 190 lb. ▶

*subjects of the same height, chest and waist measurements, e.g., particularly stout thighs. Thus, if the weight of a subject is over that stated for a particular size of suit, he should consider whether, because of one or more of his body dimensions not shown in Table 1, he needs a larger suit.*

5. In selecting the size of suit one need not be too particular so long as it is neither too small or over large. A reasonable fit is all that is necessary, comfort being the first consideration. The efficiency of the suit is not impaired by its being a little too large but creases in the material and kinks in the tubes may be the results of wearing a suit that is much too large. Some care in selection of the size is, therefore, necessary.

#### Handling

6. Care should be exercised at all times when handling suits, but this is especially necessary in cold weather when the P.V.C. tubes harden and become brittle. If a suit has been left in the cold for some time it should be conditioned by taking it into surroundings where the temperature is not less than 45 deg. F. for three or four hours before putting it on.

#### Storage

7. As received from the manufacturers the suit may be stored for long periods in conditions ranging from -30 deg. to +130 deg. F. It is packed in such a manner that the tubes are prevented from kinking and

the risk of other damage is remote. Ordinary handling of a suit in its original packing is unlikely to result in damage.

8. After being removed from its packing, the suit should be suspended, either by the loop or over a clothes hanger and hung in a dustproof cupboard away from direct heat and sunlight. The conditions in a store should be approximately 60 to 65 deg. F. and 65 % relative humidity.

#### SERVICING

##### Examination and testing

9. When a suit is unpacked, it should be examined. Holes, tears, fractured or loose tubes should be repaired in accordance with the instructions given in para. 12 before the suit is used. Any damage other than that of a minor nature should result in a suit being returned to the Equipment Section marked 'Repairable'. A repaired or apparently serviceable suit should be tested by connecting the inlet tube to an air supply delivering air at a rate of up to 14 lb./in.<sup>2</sup> at a pressure of 1.5 cu. ft./min. Ensure that all jets are clear. Suits are acceptable if not more than 12 jets are blocked and not more than three of these are connected to the same manifold. Once a suit has passed this test it should be hung in a suitable place until required or repacked and properly stored.

##### Fitting the connector to a Mk. 2A suit

10. After inspection the hose should be

cut to a length suitable for the wearer's personal dimensions. It should reach the personal equipment connector without being under tension but also without slackness. An allowance of 1 in. should be made for the attachment of the connector.

11. The connector should be screwed on to the hose using the helical coils as a thread. The end of the hose must make contact with the flange at the bottom of the connector. If lubricant should be needed, water, silicone grease (Ref. No. 34B/237) or Aquarlag 4042/DTD/500J may be used, but the two latter must be used sparingly and every care taken to ensure that no surplus is left on the hose where it could be carried by an air-stream into the bladder or tubing.

### Repairs

12. Only minor damage may be repaired by Units. Small holes may be darned or repaired with cellophane tape of suitable width and leaks in the tubes may be stopped by the attachment of P.V.C. tape secured with Durofix adhesive. Suits which require extensive repairs should be exchanged.

### Prevention of irritation

13. It is possible that some of the jets may cause discomfort and irritation by rubbing the skin. In this event the following remedial action is permissible within the limits prescribed in para. 16.

(1) Unpick the stitching securing the jets and the ends of the tubes in position, leaving the jet pockets intact.

(2) Pull out the tubes from the ends of the river tapes and shorten them sufficiently to prevent the irritation.

(3) Remove the jets from the pieces of waste tube and refit them to the shortened ends.

14. When it is not possible to pull out a jet from the waste tube, the cut end is to be blocked with a piece of wood,  $\frac{1}{4}$  to  $\frac{1}{2}$  in. long, rounded and smoothed and slightly larger in diameter than the tube. The plug is to lie wholly within the tube so that the tube extends  $\frac{1}{4}$  to  $\frac{1}{2}$  in. beyond its end.

15. When a tube is shortened, whether the jet is refitted or the end plugged, it is to be re-positioned wholly within the river tape and hand sewn back to the garment with the jet or plug remaining inside the tape—not passed through the fabric of the suit as in the original construction.

16. Not more than a total of five tubes may be plugged in any one suit and of these, not more than two are to be in any one group leading out from a single manifold.

### Cleaning

17. Cleaning of the suits is permitted and should be accomplished with warm (not hot) water and Emulsion detergent (Ref. No. 33C/1129). To assist the cleaning process and prevent the tubes from becoming blocked with dirt released from the suit, the main inlet tube should be connected to an air supply delivering air at not less than 0.25 lb./in.<sup>2</sup> but not high enough to cause excessive frothing over the side of the container.

18. The procedure is:—

(1) Connect the suit to the air supply and turn the air on.

(2) Immerse the suit in the detergent solution and gently squeeze the solution through the material.

(3) When satisfied that the suit is clean, rinse it in several changes of clean water.

(4) Hang the suit by its loop or over a clothes hanger; maintain the flow of air through the tubes until all surface water has dripped off.

(5) Turn off the air, disconnect the suit from the air supply and hang it in a suitable place to dry. This should be away from direct heat and sunlight.

19. At the intervals stated in Vol. 4 the suit should be examined, tested and repaired within the limits of para. 12. The suit should be connected to a suitable test rig capable of supplying air at the rate of 12.5 cu.ft./min. at a pressure of 1.5 lb./in.<sup>2</sup>.

20. Apply 1.5 lb./in.<sup>2</sup> pressure to the suit inlet connection and check the ventilating system for leakage using a 5% solution of Teepol. If there is sustained or violent frothing the suit should be labelled 'Repairable' and returned to the Equipment Section. Minor frothing indicates small leaks which can be repaired as described in para. 12.

21. Apply 1.5 lb./in.<sup>2</sup> pressure to the suit inlet connection and check that there is a full flow from each of the jets. If more than a total of 12 jets or more than three jets connected to one manifold are blocked the suit should be labelled 'Repairable' and returned to the Equipment Section.

22. Labels should always state the nature of unserviceability.

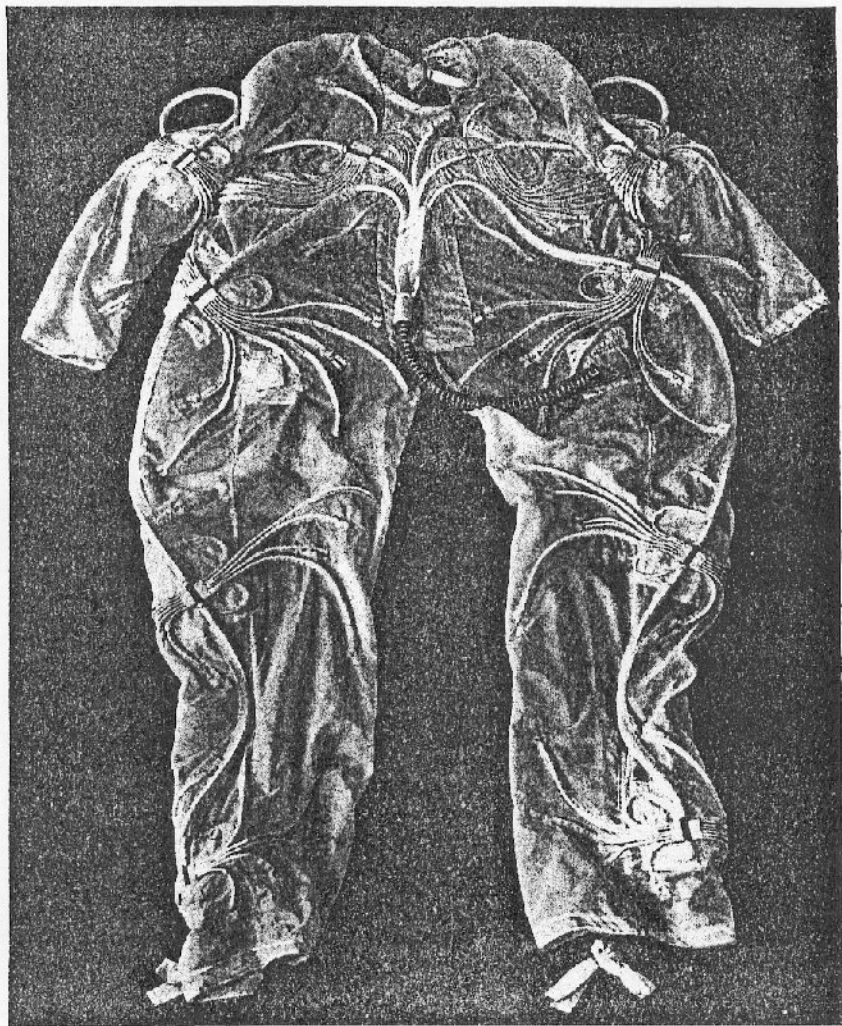


Fig. 1. Air ventilated suit, Mk. 2 : front view



Fig. 2. Air ventilated suit, Mk. 2 : back view